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Executive Editor

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Editorial

Leveling the Playing Field

Comments on an article by Thomas L. Friedman

New York Times Online, April 3, 2005

Reading the New York Times Online on April 3 changed my world forever. Thomas Friedman's article "It's a Flat World, After All" re-interprets the changing economic environment and offers an extraordinary perception of the future. It is time to repair our broken education systems that see the world around us through a rear vision mirror. The future is upon us and our students are ill prepared.

According to Friedman, we are experiencing a change in "technology and geoeconomics that is fundamentally reshaping our lives." He explains how globalization and the internet have revolutionized the way we do business. It is no longer necessary for people to come to the United States to get better paying jobs; they now have work in their own country. And it is unnecessary for teams of experts to work in a central location because we have excellent Internet based collaborative tools for the Internet with links to geographically distributed pools of knowledge.

Friedman describes ten events that propelled us from the Cold War through a period of spectacular growth and technical innovation. These benefit the global economy and flatten the playing field. Starting with the fall of the Berlin wall, he explains how computer innovations and cheap global connectivity led to out-sourcing and collaborative computing. The net result, according to Friedman, is a broader distribution of wealth and opportunity:

> *… during the 1990's . . . three billion people who were out of the game walked, and often ran, onto the playing field .. . the people of China, India, Russia, Eastern Europe, Latin America and Central Asia. Their economies and political systems all opened up during the course of the 1990's so that their people were increasingly free to join the free market. . . . many of these new entrants didn't even have to leave home to participate . . . the playing field came to them!*

He quotes Craig Barrett, CEO of Intel, to support his conclusion:

> *"You don't bring three billion people into the world economy overnight without huge consequences, especially from three societies" -- like India, China and Russia -- "with rich educational heritages."*

If education is the key to economic growth, America is falling behind. Friedman quotes Bill Gates warning to the Governor's conference on February 26th.2005:

> *"When I compare our high schools to what I see when I'm traveling abroad, I am terrified for our work force of tomorrow. In math and science, our fourth graders are among the top students in the world. By eighth grade, they're in the middle of the pack. By 12th grade, U.S. students are scoring near the bottom of all industrialized nations. . . . In 2001, India graduated almost a million more students from college than the United States did. China graduates twice as many students with bachelor's degrees as the U.S., and they have six times as many graduates majoring in engineering"*

It time for communities, governments and educational institutions to rethink the future and rebuild our educational systems to meet the needs of a global information-age economy.

Thomas L. Friedman is author of ''The World Is Flat: A Brief History of the Twenty-First Century,'' published by Farrar, Straus & Giroux and from which this and the New York Times article is adapted. His column appears on the Op-Ed page of The New York Times.

Editor's Note: The authors explore the potential advantages of online education among today's high school students. Students who struggle with behavioral issues and those who want to take advanced courses are finding online are meeting their academic needs. A major issue involves having adequate financial resources to develop a sound online program. Educators must devote time preparing curriculum materials and administrators need to offer professional development activities that enable their teachers to be effective facilitators. The authors highlight the problem with attrition among online students which continues to be higher than those in traditional education. Contemporary high school students represent an exciting frontier in the distance education movement. *BM*.

Bricks and Clicks:
A Comparative Analysis of Online and Traditional Education Settings

Freda Turner and Jack Crews

This comparative study examines online and traditional educational settings for high schools, university learners and business organization. There has been a recent trend toward the replacement of traditional classrooms with web-based learning opportunities. Most recently, hospital associations are beginning to catch on to the e-learning methodology to meet their educational requirements to save expenses and educate employees and the Department of Defense launched over a 1,000 classes last year (Gonzolas, 2005).

Online courses have been proven to be a methodology to meet learner needs for ready and convenient access to education (Buckley, 2003). A comparison of the online versus the traditional classroom environments in relation to faculty and student perceptions, student attrition rates, costs, and participation of students and instructors are examined.

Background

The classroom environment has changed significantly during the 20th century. Classrooms are evolving from the one-room rural schoolhouse constructed of wood, bricks, and mortar to learning opportunities available in an online virtual cyberspace environment in many cases. Traditionally, the learning environment was a face-to-face interaction among students and teachers at a physical site. Then in the late 19th century, distance education by means of correspondence emerged (Stadtlander, 1998). The purpose of distance education was to provide educational opportunities for individuals who were unable to attend the physical educational classroom. Students were mailed a box of books, video tapes, or CDs containing course materials**. Dr.** Jack Crews of Phoenix, Arizona coined this training strategy as "***A Box with Class.***"

Refinement in technology allowed educators to begin to use teleconferencing as a means of face-to-face instruction with students. This method of instruction was referred to as computer-mediated communication (CMC). During the 1960s and 70s a number of research studies examined the effectiveness of this style of instruction (Stadtlander, 1998). This methodology allowed a number of individuals to talk at the same time. In addition, CMC allowed for equal participation (Stadtlander, 1998). Then Interactive television (ITV), a format for synchronous classes held over an interactive network emerged. In this format, the instructor may have been in a different location or classroom but the class was live and interactive. The instructor could see and hear the students at the remote site and vice versa using technology. The result was that students at a remote site could join a class being taught on campus. The upside of this format was more students from remote areas could participate in classes without the cost and time of travel. The concern was the classes must be conducted at a location that had the appropriate technology.

During the 1990s enrollment in post-secondary education was on the decline. Initially, technology was a strategy to attract students**.** In 2001, "more than 1,100 institutions of higher education in the United States offer[ed] courses online" (Elvers, Polzella, & Graetz, 2003, p. 159)**.** Today almost every school either has online courses available or investigating implementing them. Harvard, Vanderbilt, MIT, and a number of Ivy League schools have launched initiatives on online learning. Enrollment in online courses continues to grow. The concept of a site compass with face-to-face participation has evolved to an "individual remote participant" model (Benigno & Trentin, 2000, p. 259). Today online learning is offered at most all the Ivy League universities with University of Phoenix being one of the premier providers attracting a diversified study body.

Faculty Perceptions of Teaching in an Online versus Traditional Setting

Research regarding teaching in an online environment versus a more traditional face-to-face setting indicates that key factors affect faculty perceptions of the experience. Responding to student demand for online learning environments requires faculty to venture into a nontraditional classroom. In spite of a willingness to try this style of teaching, multiple issues surface, which are not present in a traditional setting. These issues are broadly included under the umbrella of a pedagogical paradigm shift.

The challenge for the high school educator is that many students that are taking advantage of distance education are those with problems in the regular classroom. These problems may include behavioral as well as students in need a more advanced curriculum. Teachers at the high school level need to be adequately prepared for online instruction and knowledgeable about their student population.

Faculty prepares online curriculum prior to the launch of the class and this ensures a common thread runs through each of the lectures. These tasks place an extra burden on online faculty, requiring advanced preparation, and planning than is necessary for the traditional classroom faculty. Faculty must adjust to the different nature and requirements of online classes. Leonard Presby, a professor at William Paterson University, explained, "faculty members are often surprised at how much extra time is involved when they first teach an online course" (Sakurai, 2002, p. 29). It is a common expectation that online faculty will be available to respond to students questions five to seven days a week. Some institutions offering online classes expect faculty to be prompt in responding to students' questions, often within 24 hours. Presby estimated that the time an online instructor must spend in contact with students is about double that of the traditional classroom (Sakurai, 2002).

Online learning environments require the instructor to facilitate extensive written communications. While the hours are long involve posting and responding to threaded questions, evaluating student work and answering concerns and questions, the upside is "the learning appears more profound as the discussions seemed both broader and wider" (Smith, Ferguson, & Caris, 2002, p. 65). Further, online communications forces the *voicing of all the students* whereas in a traditional classroom, learners may not contribute to discussions. In an online classroom, students cannot participate, as there is a requirement to post meaningful contributions for all to see in each class and share scholarly materials.

Shifting to the role of facilitator requires faculty to re-consider the presentation of the materials. In a face-to-face class, students wait for the instructor to start class, handout syllabi, and follow the instructor's lead. Smith, Ferguson and Caris, (2002) noted, "in online instruction, the student initiates the action by going to the website, posting a message or doing something" (p. 66). Additionally, due to anonymity, students may feel certain equality with faculty while posting messages. Faculty, however, enjoy the dynamics when proper communication takes place. Online faculty must think about how material is presented because eye-to-eye contact is absent. Teaching moves instructors from the traditional role of front of the room, "on stage" (Ryan, Carlton, & Ali,

2004, p. 74) to a facilitation role, where an instructor cannot check body language to scan learner concern or understanding. Smith, Ferguson, and Caris (2002) found that to break "pieces of the information into small parts and sequence each part in such a way as to make sense to someone who is reading the information online, helped instructors to feel the online experience provided worthwhile challenges" (p. 65). Once the initial challenges of a paradigm shift are overcome, faculty report that teaching online is an "intellectually challenging forum which elicits deeper thinking on the part of the students," and "has some definite advantages that may make . . . the work worth the effort" (Smith, Ferguson, & Caris, p. 67).

Student Perceptions of Learning in an Online versus Traditional Setting

The concept of a site campus with face-to-face participation has evolved to an "individual remote participant" model (Benigno & Trentin, 2000, p. 259). To have an effective online course, Hines and Pearl suggested that there are four levels of learner interactions to incorporate. These levels of interactions include interfaces with content, instructors, classmates, and self. Students need "to be involved in the process of activities" (2004, p. 1).

In a study comparing traditional and online education programs, Althaus examined the academic performance of students who had face-to-face discussions versus those who used on-line discussions. Althaus found that students who were involved in online discussions created responses that were more thoughtful because they had more time to read and think about their responses compared to students in a face-to-face setting. Althaus also found that the student in the online class earned higher grades than that of the student in the traditional classroom (Christopher, Thomas, & Tallent-Runnels, 2004).

However, there is a paucity of scientifically sound research regarding student perceptions of learning in an online environment versus a more traditional face-to-face setting. The exploration to date indicates variation in the study results. Traditional education programs do not fit into the schedules of adult learners. The use of an online forum appeals as an alternative way to complete a degree (Kozlowski, 2002). According to Kearns, Shoaf, and Summey (2004), most students were satisfied with the flexibility of an online education platform. The "convenience, flexibility, and course quality were the primary motivators for taking online courses" (p. 281). In addition, accessibility of content resources, the frequency, and timeliness of faculty feedback, and the use of innovative learning environments were other advantages over traditional face-to-face learning modalities. However, a majority of students said they would take another online course.

Bocchi, Eastman, and Swift (2004) also found that flexibility was a key satisfaction indicator for online learners. Bocchi, et. al determined that curiosity, scheduling issues, and a strong desire to attempt online courses were drivers of whether students sought to learn in a traditional face-to-face environment or in an online environment. Leasure, Davis, and Thievon (2000) discovered that the traditional classroom afforded students the opportunity for direct interaction with decreased procrastination and immediate feedback fostering more meaningful learning experiences than that which is found in an online forum. However, Leasure et. al also discovered that an online forum afforded the student flexibility with various methods of communication, which increased student confidence. Buckley (2003) found that since "online communications moves the ear to the eye as the dominant form of language, . . . this same processing contributed to feelings of isolation and interfered with collaborative learning processes" (¶ 11).

Student Attrition and Cost Analysis of Online Versus Traditional Settings

There is an ongoing concern regarding student success and dropout rates for online students. Researcher Ryan (2002) found that "currently distance students have higher dropout rates than classroom students" (p. 7). Kleinman and Entin conducted a study comparing attrition data gathered from online and traditional courses. Data indicated no significant differences between the two groups in achievement. However, "the technology hurdle was responsible for a large drop

in enrollment within the first few weeks of the semester for the online students, whereas for the in-class students, the attrition was lower and more gradual" (2002, p. 1). A study conducted by Terry (2001) at West Texas A&M University found potential explanations for higher attrition rates included "students not being able to adjust to the self-paced approach in the virtual format, the rigor of study being more difficult than students anticipated, and a lack of student and faculty experience with the instruction mode" (¶ 5). Using online learning strategies with high school students provides them with flexibility of when and where they take needed courses, which may lead to fewer dropouts. The schools can also expand their curriculums to accommodate a larger population. Another upside to online learning for high schools is it may provide a cost-reduction strategy for students that are *home bound* for a medical condition. Currently, many states fund teachers visiting homebound learners to preclude them from missing too much class and failing. Online learning might provide the learner with an opportunity to remain engaged in learning while reducing state funding costs to those students that have access to computer technology.

Currently the attrition rate of the online learner is greater than that of the attrition rate for the traditional student. The reasons for the higher attrition rate varies among learners and can range from difficulty with self-direction, poor technology skills, or realization that courses are more difficult and time consuming than anticipated. It is also noted, "five of six online students are employed and would not be able to attend traditional classes" (Bocchi, Eastman & Swift, 2004). Employment responsibilities may also contribute to the attrition rate to a higher degree than in traditional learning environments that have a lower per student employment rate. Despite of the higher attrition rate for online learners when compared with traditional learners it was reported that those who stay with the program report a higher satisfaction rate with regard to their education because of the familiarity with online learning and the ownership that is felt in the online education process.

Offering online learning environments is an expensive proposition. As the number of virtual learners continues to increase, institutions will benefit from higher retention rates. "A major concern for institutions is the cost of online education, because it is expensive to prepare and teach each course" (Bocchi, Eastman, & Swift, 2004, p. 246). Technology infrastructure, professional development of faculty, licensing, internet connection, and curriculum development are some of the hidden costs incurred by institutions. Course instructors, as well as, technical support staff also increase the cost per student.

Conclusion

Online courses are gaining acceptance in traditional higher learning institutions, high schools and business organizations. "From the Ivy League to small community colleges and now some high schools, a majority of higher education institutions report that online learning provides better than traditional, face-to-face classroom instruction (Roach, 2003). The two methods of instruction do not need to be rivals, as both possess advantages that meet the needs of different students and faculty. In the academic universe, there is room for online and traditional classroom education to co-exist peacefully. Further, as collaborative partners the two instructional methods can together achieve the ultimate goal of providing academic opportunities to all resulting in a better society.

Online education is becoming a norm in education as funding and geographies affect the delivery of educational lessons. An analyst for a consulting group in education businesses reported," the virtual school market is definitely expanding" (Annone, 2001, p. 32). The current teacher shortages and overcrowded facilities are driving secondary schools to handle their burgeoning student populations to new directions including through online programs. Therefore, high schools contemplating distant education programs are headed in the right direction, but will need to make adequate preparation before embarking on online learning.

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Editor's Note: This experimental study compares learning from a computer simulation with a traditional electronics laboratory. The simulation eliminates the time required for equipment setup, reduces computation time, and increases accuracy and reliability of results. Human variables that lead to possible errors and ambiguity are reduced. Overall, the computer simulation results in time savings, less ambiguity, greater accuracy, and an overall increase in learning.

Changing the Nature of Undergraduate Electronics Science Practical Work

Yogendra Babarao Gandole

Introduction

Advancing technology has opened many doors in education. It is a long time since televisions and VCRs were first used in teaching. After something has been taught conventionally, teaching the topic visually adds a new level of understanding for the student.

The next step was to add interactivity. Not only was the student be able to see what is involved, but he or she would be able to learn from hands on experience. Computers are an effective way to accomplishing this.

Computers can also be used to design and access supplemental references. When used before a lab, these increase familiarity with certain lab procedures as shown in an experiment involving first-year undergraduate *Electronics* students. In this study, the experimental group used computers for selected electronic experiments; the control group studied by traditional methods (printed material and demonstration of experiments). A competency test determined the level of skill acquired by learners of both groups. The test was administered three times - as a pretest, posttest and retention test. The investigator analyzed test data to compare acquisition of knowledge and skills for each student against the predetermined objectives. Specific goals for the computer software support were to:

1. Communicate basic knowledge (theory) related to practical work in electronics.
2. Assist students in selecting the measuring instruments and electronics components required to perform an experiment in laboratory.
3. Develop competency in circuit assembly.
4. Demonstrate correct experimental procedures.
5. Simplify calculation and obtain accuracy in design and results.

Background

Many researchers have studied the effects of using computers in various aspects of classroom learning. In general, the research has focused on four areas: achievement, attitudes, group and individual behavior, and gender interactions. Results for each of these areas is summarized below.

Achievement

Several studies have focused on how use of computers affects students' achievement (Brasell, 1987; Brungardt & Zollman, 1995). Typically, these studies define achievement very narrowly, for example, graphing skills or a single kinematics concept. Often achievement is defined as the ability to perform a specific task or skill, or a set of tasks and skills. Very few studies look at achievement in any broader sense, such as overall lab performance or course grades (Tsai, Bethel, & Huntsberger, 1999; Leonard, 1992). A few meta-analyses have examined the literature on how computers affect achievement (usually defined narrowly), and found no clear answer on whether or not computers in the classroom enhance student achievement (Kulik & Kulik, 1980, 1986). In college physics, the use of microcomputer-based labs (MBLs) has had mixed results for student performance on certain skills and concepts (Beichner, 1996).

Attitudes

One of the recurring advantages attributed to using computers in the classroom is more positive student attitudes (Brasell, 1987; Brungardt & Zollman, 1995). Using computers in a classroom is believed to lead to more positive attitudes in students because computers can do many things quickly and precisely, and because many students prefer using computers. However, there is little research to support such claims. This feeling that computers engender more positive attitudes seems to stem more from teachers' personal experiences rather than from actual research (for example, Brasell, 1987 and Cordes, 1990). The limited research available suggests that computers can lead to more positive attitudes for specific student groups (males, younger students).

Although the importance of hands-on labs to the science curriculum cannot be denied, Garcia (1995) cites several advantages of computer simulations compared to laboratory activities. First, there appear to be important pedagogical advantages of using computer simulations in the classroom. Second, the purchase, maintenance, and update of lab equipment is often more expensive than computer hardware and software. Furthermore, there is no concern for students' physical safety in this learning environment.

Thomas and Hooper (1989) discuss the instructional use and sequencing of computer simulation and its effect on students' cognitive processes. The sequence in which learning occurs influences the stability of cognitive structures (Ausubel, 1968). New knowledge is made meaningful by relating it to prior knowledge and optimization of prior knowledge is accomplished through sequencing. According to Gokhale (1991), simulations used *prior to* formal instruction build intuition and alert the student to the overall nature of the process. When used *after* formal instruction, the program offers the student an opportunity to apply the learned material.

There is evidence that simulations enhance students' problem solving skills by giving them an opportunity to practice and refine their higher-order thinking strategies (Quinn, 1993). Computer simulations were found to be very effective in stimulating environmental problem solving by community college students (Faryniarz & Lockwood, 1992). In particular, computer simulation exercises based on the guided discovery learning theory can be designed to provide motivation, expose misconceptions and areas where knowledge is deficient, integrate information, and enhance transfer of learning (Mayes, 1992). In three studies, students using the guided version of computer simulation surpassed unguided students on tests of scientific thinking and a test of critical thinking (Rivers & Vockell, 1987). As a result of implementing properly designed simulation activities, the role of the teacher changes from a mere transmitter of information to a facilitator of higher-order thinking skills (Woolf & Hall, 1995). According to Magnusson and Palincsar (1995), simulations are seen as a powerful tool to teach not only content, but also thinking or reasoning skills that are necessary to solve problems in the real world.

Purpose of the Study

This study examined the effectiveness of computer software in traditional lab activities to enhance overall student competency in conducting electronics experiments. The following research questions were examined:

1. Will there be a significant difference in *theoretical knowledge of electronics* among students in electronics?
2. Will there be a significant difference in *overall competency* of students regarding various electronics experiments
3. Will there be a significant difference in *time required to perform* the various experiments.

Methodology

Population And Sample

For convenience, the investigator limited this experiment to the Amravati Division of Maharashtra State, in India. There are 12 colleges in Amravati University which offer undergraduate Electronics subjects. The total population for FY B.Sc. is approximately 200. The research is limited to practical work, available class offerings, and computer labs. Four colleges were selected for samples to ensure reliability and depth of information.

Selection Of Groups:

Respondents for the investigation were first year science students in four colleges that offer electronics, namely Brijlal Biyani Mahavidyalaya Amravati, Adarsha Mahavidyalaya, Dhamangaon Rly, Shivaji Science College Akola and Amlokchand Mahavidyalaya Yavatmal.

On the basis of learner performance in a previous achievement test in electronics, FY B.Sc. classes were divided into two groups (experimental and control), each with 50students. Sampling was done by a stratified random sampling method.

A ‘t’ test was administered to find out the significance of the difference between mean scores of the control group and experimental group in the pre test. The analysis provided that there was no significant difference between the two groups. It established the fact that the two groups selected on the basis of the achievement test were nearly equivalent.

Tools Construction :

The investigator selected the five experiments of in electronics of FY.B.Sc. Syllabus, namely:

1. Verification of Thevenin’s Theorem,
2. Construction and study of characteristics of PN Junction diode,
3. Construction and study of half-wave rectifier,
4. Construction and study of transistor under CB mode and
5. Construction and calibration of series type ohmmeter.

First, the investigator determined learner difficulties in performing the experiment with the help of a diagnostic test.

In the ***first phase,*** the pretest was conducted on both control and experimental groups. The pretest contained 30 multiple choice questions to measure achievement and 11 check points per experiments to measure competency. A tryout of the test was administered to 30 students of FY B.Sc. The same test was administered to the same persons at a later date, and the two sets of

scores correlated to determine the reliability of test items. Validity was measured by correlating the achievement test score and pre-exam physics scores for FY B.Sc. An item analysis was carried out on the results that employed information on item difficulty. Reliability was estimated to be using the test-retest repetition method. The coefficient of correlation was 0.92, 0.97 and 0.9762 showing that the test was satisfactorily reliable. Also the correlation coefficient was 0.88, 0.86 and 0.93 showing that the test was satisfactorily valid.

The pretest was administered to all participating students to assess prior knowledge of selected experiments and initial equivalence between groups.

In the ***second phase,*** computer software was developed as per requirements. Computer software support was given to the experimental group for two hours daily for 15 days. Students performed experiments and recorded their observations as instructed in the computer software. Competence in performing the experiment was examined with the help of competency test and observation of students (Checklist) while performing the experiment. The control group was taught by traditional method. In the ***third phase***, a posttest was administered to measure treatment effects. This test was designed to assess the content that was previously learned and how students applied the learned material. The pretest, posttest and retention test were the same test. Since the study was conducted over a six month period, there was limited concern for the students becoming "test-wise". A retention test was conducted on both groups three months later.

Development Of Computer Software Support

The software was developed using mixed mode design methodology. It selectively used the objects of, top-down and bottom-up design based on the current task to solve. Overall the development structure could be called evolutionary with some rapid prototyping.

Steps In Software Development

1. Clear understanding of the problem: Problem Specification.
2. Careful solution design: Paying attention all the constraints:
3. Transform algorithm into a program code: Abstraction and coding.
4. Complete debugging: Error removal.
5. Thorough testing:
6. Maintenance dictated by environmental changes.

Drafting The Frames In Computer Software

A frame presents a small unit of information, requires active responses, and may give immediate reinforcement. For the present study, the investigator prepared the programme in Visual Basic, Visual C++, HTML and SPICE. The investigator ensured that the frames were unambiguous, brief, simple and straightforward with sequential presentation of frames for each of different mode, viz. simulation, demonstration, laboratory guide, experiment result calculation and design of circuit. The software provided a multimedia platform to attract the senses of learner for ease and happy learning.

Analysis Of Data

The main point of this study was to determine the results of adding computer software support to an electronics laboratory practical learning. Various measures were used to determine different effects on students: tests and grades to measure achievement, to measure attitudes, to measure skills, and to measure opinion regarding computer software support.

After collecting the data, analysis was made. Mean, Standard deviation and Coefficient of correlation were calculated for the pre and posttest scores for the control group and experimental group. Using "t" test, significance of the difference between the mean of the pre, post and retention test was computed for both the groups separately. Further, relationship between pre and posttest scores for control and experimental groups were studied. The significance of difference between the pretest, posttest and retention test scores for control group and experimental group was tested employing "t" test. The level of significance (alpha) was set at 0.01 for all tests of significance.

Achievement And Competency Test Analysis :

Table 1 summarizes the analysis of pretest scores both the groups of FY.B.Sc. students. The mean of the pretest scores for the experimental group was not significantly different from the control group for all classification. Hence it was concluded that treatment groups were similar.

Table 1

Comparison of Pretest Performance : FY. B.Sc.
Test Type : Achievement test

		Experimental Group			Control Group				
S.	Category	N	Mean	S.D.	N	Mean	S.D.	't' (0.01)	P
1	All Students	50	14.16	4.4237	50	14.36	4.3209	NS(0.23135)	18.25 %
2	All male	25	13.6	3.87814	25	13.6	3.57770	NS(0.0)	0.00 %
3	All female	25	14.72	4.6606	25	15.12	4.83586	NS (0.34039)	26.50 %

A 't' test was conducted on the pretest scores for two treatment groups. The mean of the pretest scores for the all experimental group students (14.16) was not significantly different from the control group (14.36) ('t' =0.23135) at 0.01 alpha level. Similarly the mean of experimental group male students (13.6) was not significantly different from the control group male students (13.6) (t=0 at 0.01 level), the mean of experimental group female students (14.72) was not significantly different from the control group female students (15.12)(t=0.34039 at 0.01 level).

Table 2

Comparison of Pretest Performance : FY. B.Sc.
Test Type : Competency Test

		Experimental Group			Control Group				
S.	Category	N	Mean	S.D.	N	Mean	S.D.	't' (0.01)	P
1	All Students	50	18.62	3.59382	50	18.76	3.83958	NS (0.18823)	14.89%
2	All male	25	19.48	4.09018	25	19.24	3.95251	NS (0.21097)	16.62%
3	All female	25	17.76	2.83943	25	18.28	3.66081	NS (0.5612)	42.27%

Table 2 summarizes the analysis of pretest scores of FY.B.Sc. students for both groups. The mean of the pretest scores (18.62) for the experimental group was not significantly different from the control group (18.76) ('t'= 0.18823 at 0.01 alpha level). Hence it was concluded that treatment groups were similar in competency.

Table 3

Comparison of Test performance by Instructional method : Posttest : FY. B.Sc Test Type: Achievement test

		Experimental Group			Control Group				
S.No	Category	N	Mean	S.D.	N	Mean	S.D.	't' (0.01)	P
1	All Students	50	43.04	7.0227	50	36.8	4.7833	S(5.1928)	99.99 %
2	All male	25	43.28	7.9171	25	35.92	4.74906	S(3.9860)	99.99 %
3	All female	25	42.8	5.9866	25	37.68	4.65377	S (3.376098)	99.99 %

Table 3 summarizes the analysis of posttest scores of FY.B.Sc. students for both the groups. The mean of the posttest scores (43.04) for the experimental group was significantly higher than the control group (36.8). This difference was significant at the 0.01 alpha levels ('t'= 5.1928). Hence it was concluded that the theoretical knowledge of experimental group students was raised as compared to control group students.

Table 4:

Comparison of Test performance by Instructional method : Posttest : FY. B.Sc. Test Type : Competency Test

		Experimental Group			Control Group				
S.	Category	N	Mean	S.D.	N	Mean	S.D.	't' (0.01)	P
1	All Students	50	58.06	4.43355	50	51.3	9.09340	S (4.72493)	99.99 %
2	All male	25	57.41	4.95745	25	52.45	7.30855	S (2.75054)	99.99 %
3	All female	25	58.44	3.71031	25	49.92	10.4457	S (3.842988)	99.99 %

Table 4 summarizes the analysis of posttest scores of FY.B.Sc. students for both the groups. The mean of the posttest scores (58.06) for the experimental group was significantly higher than the control group (51.3). This difference was significant at the 0.01 alpha levels ('t'= 4.7249 at 0.01 alpha level). Hence it was concluded that the experimental skill and overall competency of experimental group students was raised as compared to control group students.

Table 5

Comparison of Test Performance by Instructional Method : Retention test : F.Y. B.Sc. Test Type : Achievement test

		Experimental Group			Control Group				
S.	**Category**	**N**	**Mea**	**S.D.**	**N**	**Mea**	**S.D.**	**'t' (0.01)**	**P**
1	All	50	44.68	7.3605	50	34.76	5.3499	S (7.7087)	99.99
2	All male	25	44.32	8.2690	25	33.52	5.4926	S (5.4396)	99.99
3	All female	25	45.04	6.3022	25	36	4.8989	S (5.6624)	99.99

Table 5 summarizes the analysis of retention test scores of FY.B.Sc. students for both groups. The mean of the retention test scores (44.68) for the experimental group was significantly higher than the control group (34.76). This difference was significant at the 0.01 alpha levels ('t'=7.7087 at 0.01 level). Hence it was concluded that the theoretical knowledge of experimental group students was raised and retained.

Table 6:

Comparison of Test Performance by Instructional Method : Retention test : F.Y. B.Sc. Test Type : Competency Test

		Experimental Group			Control Group				
S.	**Category**	**N**	**Mean**	**S.D.**	**N**	**Mean**	**S.D.**	**'t' (0.01)**	**P**
1	All Students	50	59.7	3.04138	50	51.48	8.1565	S (6.67699)	99.99 %
2	All male	25	56.6	3.44093	25	52.36	6.71642	S (4.69998)	99.99 %
3	All female	25	59.8	2.57681	25	50.6	9.29516	S (4.6726)	99.99 %

Table 6 summarizes the analysis of retention test scores of FY.B.Sc. Students for both groups. The mean of the retention test scores (59.7) for the experimental group was significantly higher than the control group (51.48). This difference was significant at the 0.01 alpha levels ('t'=6.6799 at 0.01 level). It indicated that, the skill and overall laboratory practical competency of the experimental group was raised and retained significantly more than control group students.

Time Analysis.

Table 7 presents the data and analysis of time responses of students to complete the six different stages of experiments. It was found that the overall average time required for the experimental group was significantly lower than the control group students. Hence it was found that the time to complete the experimental criterion for experimental group is less than the control group, has allowed experimental group students more time for critical thinking and drawing conclusion.

Table 7

Comparison of Time : (N= 50)

Activity	Group	Average time in minutes	S.D.	't' (0.01)
Design	Control	23.6	2.575	44.461 (S)
	Experimental	5.52	1.0736	
Circuit Assembling	Control	18.08	3.691	0.74155 (NS)
	Experimental	15.58	3.01757	
Observation	Control	17.02	2.699	0.6848 (NS)
	Experimental	16.68	2.2446	
Calculation	Control	28.3	3.29	48.099 (S)
	Experimental	4.56	1.1633	
Result/ Conclusion	Control	7.92	0.853	21.57 (S)
	Experimental	4.28	0.834	
Circuit parameter change effect	Control	23.32	2.591	46.61 (S)
	Experimental	5.52	0.762	
Total Activities	Control	117.7	11.03	33.83 (S)
	Experimental	54.14	7.3983	

Findings

A *t*-test was conducted on the pretest scores for the two treatment groups. The mean of the pretest scores for the experimental group (18.62) was not significantly different from the control group (18.76) (t = 0.188235). Hence, it was concluded that treatment groups were similar.

Research Question 1

Will there be a significant difference in theoretical knowledge of electronics among students in electronics?

As shown in Table 3 and 5, the mean of the posttest scores for the Experimental group (43.03) was significantly higher than the control group (36.8). This difference was significant at the 0.01 alpha level (t = 5.1928). Also the mean of the retention test score for the Experimental group (44.68) was significantly higher than the control group (34.76). This difference was significant at the 0.01 alpha level (t=7.7087).

Research Question 2

Will there be a significant difference in overall competency of students regarding various electronics experiments?

As shown in Table 4 and 6, the mean of the posttest scores for the Experimental group (58.06) was significantly higher than the control group (51.3). This difference was significant at the 0.01 alpha level ('t'= 4.72493). Also the mean of the retention test score for the Experimental group (59.7) was significantly higher than the control group (51.48). This difference was significant at the 0.01 alpha level ('t' =6.676989).

Research Question 3

Will there be a significant difference in time, required to performing the various experiments?

To investigate this question the criterion measure was time to complete the final physical laboratory experiment. The table 7 presents this data. As shown in Table 7, the mean of the Total time required for the Experimental group (54.14 Min) was significantly lower than the controlled group (117.7 Min.). This difference was significant at the 0.01 alpha level), (‘*t*’ = 33.83).

Discussion

After conducting a statistical analysis on the test scores, it was found that students who used the computer software integrated into laboratory activities performed significantly better on knowledge, skills and overall competency than the students who were taught using the traditional laboratory method of instruction. It was found that the time to complete the experimental criterion for experimental group is significantly less than the control group, and thus allowed experimental group students more time for critical thinking and drawing conclusions.

The computer-based simulation software enabled students to experiment interactively with fundamental theories and applications of electronic devices. It provided instant and reliable feedback. Thus, it gave students an opportunity to try out different options and evaluate their ideas for accuracy, almost instantly. The traditional lab students assumed the lab equipment was not always accurate and reliable and sometimes made the mistake of attributing their design errors to experimental errors. Thus, the simulation activity focused mainly on the mental activity that took place within the learner. The lab activity focused on physical as well as mental activity.

In addition, the time needed for hands-on work may have contributed to the difference between the two groups. The control group had to physically implement their ideas with real components and then test them, which took a lot more time. The control group students could evaluate only a limited number of options within the allotted time. Also, based on informal observations, many students in the control group appeared to be easily frustrated if they took time to build a circuit to test an idea and it did not work as expected. In contrast, the students in the experimental group appeared excited, perhaps because it took relatively less time to test new ideas and concepts and they received immediate accurate feedback.

Conclusions

Based on the results of this study, it can be concluded that effective integration of computer software into traditional laboratory activities enhances the performance of the students. Guided computer software activities can be used as an educational alternative to help motivate students into self-discovery and develop their reasoning skills. The laboratory activity can then focus on the actual transfer of knowledge. This strategy helps improve the effectiveness and efficiency of the teaching-learning process.

In situations where the objective of instruction is to learn the facts without application or transfer, method of instruction is not a significant factor. However, if the educational goal is for students to transfer and apply the knowledge to real-world problems, then simulations integrated into the class structure may be an effective learning strategy. Also, these activities should be based on guided exploratory learning and be designed to stimulate students' thinking processes.

It is recommended that further research be conducted to evaluate the effects of using guided-discovery instructional strategies on enhancing the problem-solving ability of students with different achievement levels, using different academic subject material. Also, there is a need to investigate the different cognitive models that students employ in understanding and evaluating technical concepts. This will provide the research community with vital insight into the design of computer simulations for improving higher-order cognitive skills.

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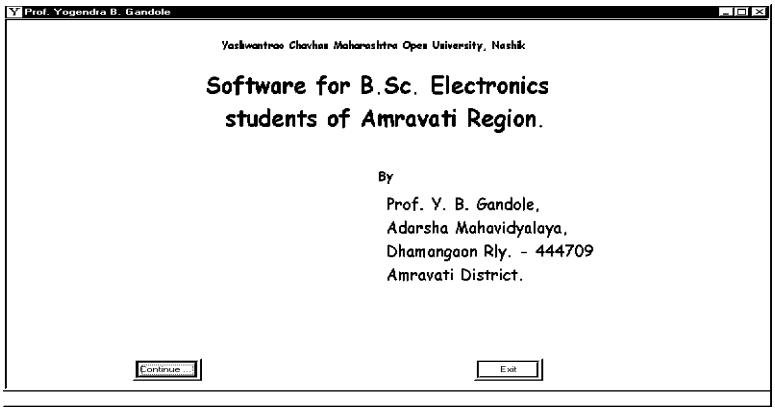
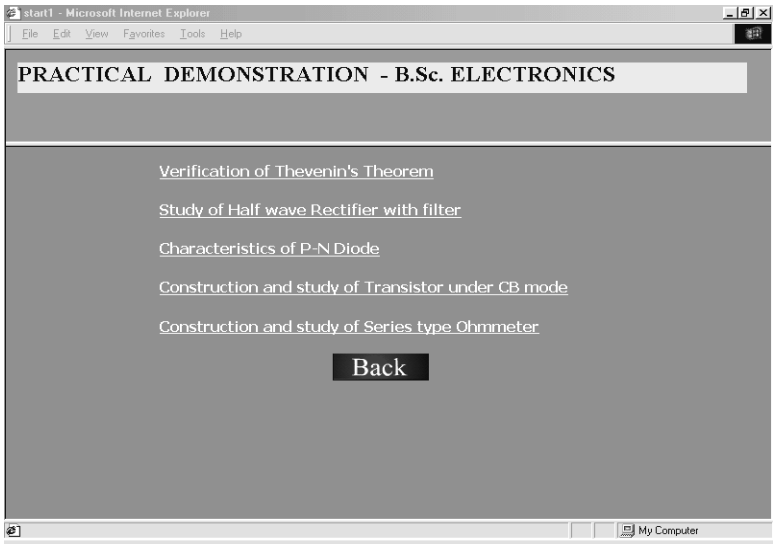
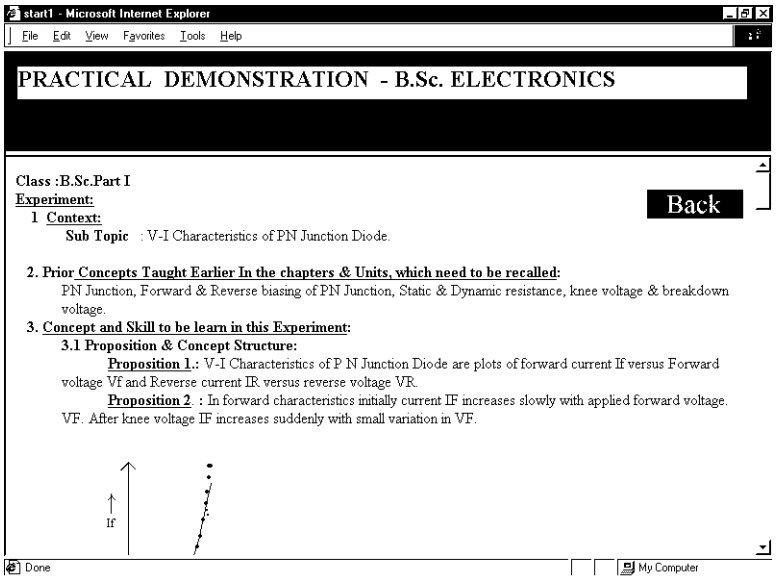
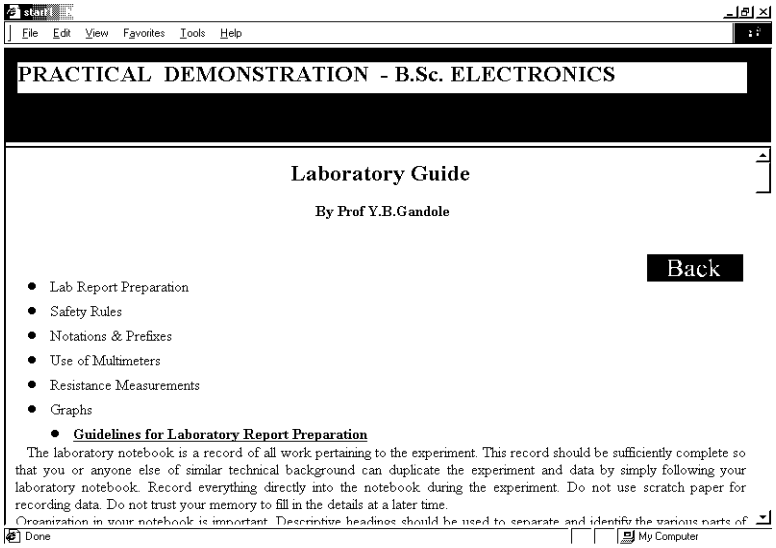
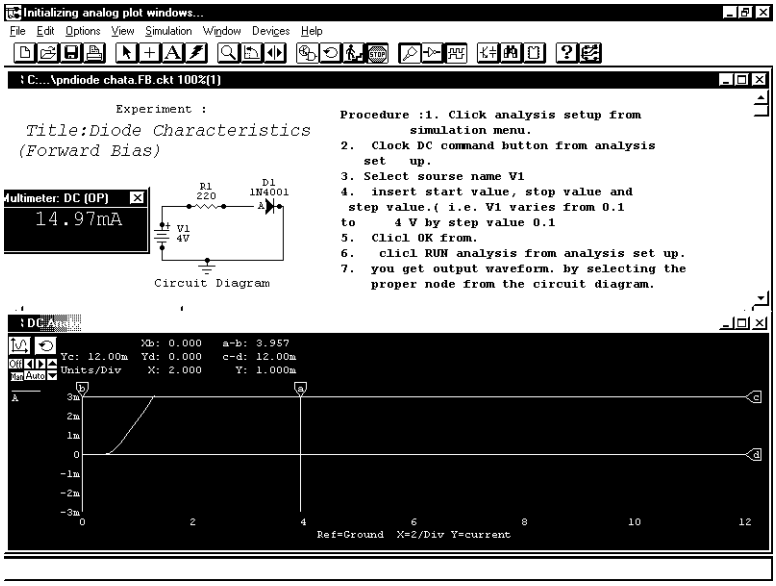
Sample Software Screens








File Edit View Favorites Tools Help
PRACTICAL DEMONSTRATION - B.Sc. ELECTRONICS
Laboratory Guide
By Prof Y.B.Gandole
Back
Lab Report Preparation
Safety Rules
Notations & Prefixes
Use of Multimeters
Resistance Measurements
Graphs
Guidelines for Laboratory Report Preparation
The laboratory notebook is a record of all work pertaining to the experiment. This record should be sufficiently complete so that you or anyone else of similar technical background can duplicate the experiment and data by simply following your laboratory notebook. Record everything directly into the notebook during the experiment. Do not use scratch paper for recording data. Do not trust your memory to fill in the details at a later time.
Done
My Computer


Initializing analog plot windows...
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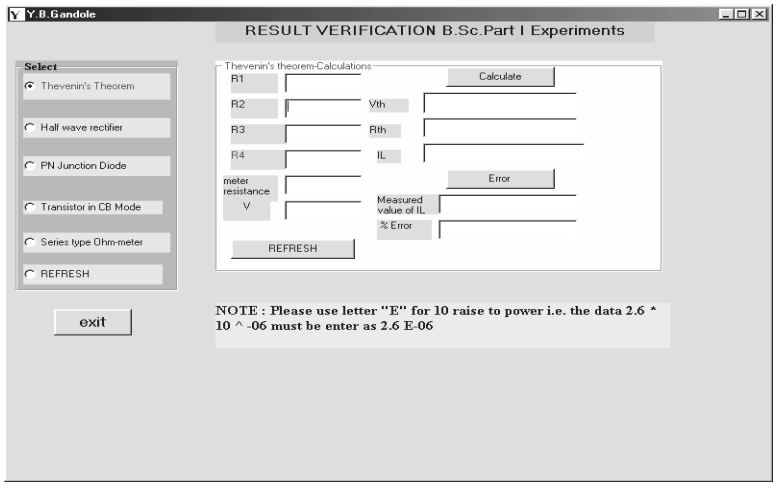
Experiment :
Title:Diode Characteristics
(Forward Bias)
Multimeter: DC (OP)
14.97mA
R1
220
D1
1N4001
V1
4V
Circuit Diagram
Procedure :1. Click analysis setup from simulation menu.
2. Clock DC command button from analysis set up.
3. Select sourse name V1
4. insert start value, stop value and step value.(i.e. V1 varies from 0.1 to 4 V by step value 0.1
5. Clicl OK from.
6. clicl RUN analysis from analysis set up.
7. you get output waveform. by selecting the proper node from the circuit diagram.
DC1
Xb: 0.000 a-b: 3.957
Yc: 12.00m Yd: 0.000 c-d: 12.00m
Units/Div X: 2.000 Y: 1.000m
Ref=Ground X=2/Div Y=current


Y.B.Gandole
RESULT VERIFICATION B.Sc.Part I Experiments
Select
Thevenin's Theorem
Half wave rectifier
PN Junction Diode
Transistor in CB Mode
Series type Ohm-meter
REFRESH
exit
Thevenin's theorem-Calculations
R1
R2
R3
R4
meter resistance
V
Vth
Rth
IL
Measured value of IL
% Error
Calculate
Error
REFRESH
NOTE : Please use letter "E" for 10 raise to power i.e. the data 2.6 * 10 ^ -06 must be enter as 2.6 E-06

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Editor's Note: The increasing use of collaborative computing in all sectors of the economy gives added urgency and value to this research. Murphy and Laferrière examine factors, such as trust, that influence the ability of virtual communities to collaborate effectively. They use tools based on group development theory to measure relationships building through online facilitation and discussion.

Identifying and Facilitating Group-Development Processes in Virtual Communities of Teacher-Learners

Elizabeth Murphy and Thérèse Laferrière

Keywords: Content analysis: online discussions; group development theory; computer-mediated communication; virtual communities; online facilitation

Abstract

Through analysis of the written trace of asynchronous communication messages among teacher-learners in a virtual community, processes of social interaction were investigated in order to gain insight into how communities of learners may collaborate. Using group-development theory focusing on how a group that is meeting face-to-face moves through stages of initial distrust to trust, an eight-point scale instrument was developed to code messages from two groups of teacher-learners participating in online discussions. Results indicated that there was growth leading to interinfluence but that the group did not fully reach a stage of shared understandings. Group development in virtual communities can be facilitated through use of the various assessment tools provided by group-development theory. Group moderators and participants can formatively evaluate group interactions through an ongoing analysis or monitoring of written traces of communication of electronic messages.

Introduction

Computer-mediated communication can facilitate collaborative learning strategies and approaches (Hiltz, 1990) thus providing opportunities for virtual communities of learners to collaborate in ways that lead to shared understanding of professional questions and issues. Facilitating such collaboration in virtual communities represents an aim for those interested in the design and delivery of such learning opportunities. However, fostering real collaboration and coherence in such communities is not easily accomplished (Hewitt, Scardamalia, & Webb, 1997).

A virtual community of learners is a loosely defined notion, one that taps into the potentials of virtual collaborative spaces for geographically dispersed individuals. We conceive of learning as a construct mediated by language via social discourse (Vygotsky, 1978). The development of shared goals and understandings is seen as an ideal for those wanting learners to benefit from online written discourse (Harasim et al., 1995). Analysis of a group's written discourse in general and of specific communication messages between group members in particular, represents a means to gain insight into some of the processes that are conducive to building shared goals and understandings. Through analysis of the written trace of asynchronous communication messages among learners in a virtual collaborative space, we can investigate these processes of social interaction.

The aim of this investigation is to identify group-development processes that develop in asynchronous discussion in order to gain insight into how virtual communities of teacher-learners can collaborate in ways that lead to shared goals and understandings and to determine

implications for online facilitation of group development. The specific objectives of this inquiry are to:

- Identify how group theory can inform the development of virtual learning communities;
- Identify group-development processes taking place in the context of a virtual community of teacher-learners participating in an ongoing asynchronous online discussion;
- Determine implications for facilitation of collaborative group-development processes in virtual communities of learners.

Theoretical framework

The opportunities for many-to-many-interaction which are made possible by the asynchronous, time-and-place independent, online classroom represent one of the essential attributes and potential of such forms of learning (Harasim, 1990): "Computer conferencing software, which automatically files notes into topical discussions and updates users on any new comments in a topic, is currently one of the most appropriate online environments for learning collaborations" (p.45). In relation to collaborative learning, conferences provide a "fertile forum for interaction", active involvement, socio-emotional engagement and for construction of meaning among participants (p. 45). Online educational environments provide support for collaborative conversations and construction of understanding (Brown, 1990).

Virtual learning communities exist only because of individuals' visible engagement through writing and reading in dedicated online collaborative spaces. Engagement in learning as the first condition for learning is a well-known condition in the domain of educational psychology (Nystrand & Gamoran, 1991; Pintrich & De Groot, 1990) and among professional educators working in face-to-face and/or virtual learning environments (Hmelo, Guzdial, & Turns, 1999 ; Persell, 2004). Student engagement in online discourse is reflected in social interaction for learning purposes, which is another critical condition for learning (Vygotsky, 1978).

From a socio-constructivist perspective, the development of collaboration plays an important role in knowledge construction (Jonassen, 1994; Resnick, 1991). Understanding collaborative learning includes the understanding of how individuals function in a group. Group psychology has developed a body of knowledge on group processes that may apply to understanding and facilitating the development of virtual communities. This investigation focuses on group processes in order to gain insight into the level of collaboration reached and to determine how a group may reach a stage of interinfluence in accomplishing shared learning goals.

Theory related to group development is meant to provide insight into the processes at work when individuals come together as a group for specific purposes. One such theory was elaborated by Gibb and Gibb (1967). Trust-Level or TORI theory provides a framework from which to understand how group processes manifest themselves. TORI is an acronym reflective of four group processes: Trust formation, Open communication, Realization of goals, and Interdependence (here referred to as Interinfluencing). According to TORI theory, in group development, fears become superseded by trust. When trust is high, relative to fear, participants function well whereas when fear is high relative to trust, they break down or do not develop. The same is true for organizational systems (Dirks & Ferrin, 2001). Trust is the primary ingredient that enhances each of these processes while fear is the primary barrier.

Our working hypothesis is that when the focus is on communication for better professional action (task-oriented) rather than on interpersonal support (person-oriented), group processes and their evolution may therefore be apprehended through discourse analysis of a socio-cognitive rather than socio-affective nature. Applying the Gibb's theory, the growth of engaged participants

occurs as a movement from fear towards increasing trust. In this study, the primary correlates of this central process are the following four: movement from depersonalization and role taking towards greater personalization of learning intentions; from a closed, defensive system of communication towards more open exchange of intentions, questions, doubts and issues; from imposed learning objectives towards greater group (or community) self-determination; and from dependency towards one or a few leaders' greater interdependence and interinfluence (fluidity of leadership and membership).

Methodology

The inquiry involved teachers participating in a virtual learning community (Murphy, 2000). Two groups took part in the study: one group (CREDO) was anglophone and the other (CREO) was francophone. CREDO operated for a nine month period while CREO operated for an eight month period. While the composition of each group was international and thus geographically heterogeneous, participants had in common that they were teachers of French as a second or foreign language interested in using the Internet to advance their practice. There were 42 participants in the CREDO list and 23 participants in the CREO list.

Using group-development theory (Gibb, 1967; 1972; 1978), an instrument was developed to code each message using an eight-point scale centered on four main processes of **Trust formation; Open communication; Realization of goals; Interinfluence.**

Each of these four main processes was divided into two phases corresponding to what the Gibb (1978) describes in face-to-face encounters as:

1. Signs of early phases of development characterized largely by fear;
2. Signs of later phases of development characterized by trust.

For the purposes of this study and in relation to virtual communities and analysis of written traces of online discourse, we substitute the notion of distrust for Gibb's notion of fear. Indicators that could be visible online were retained. The instrument is presented in the following four tables according to the four main processes with corresponding indicators and illustrative examples taken from the coding.

Table 1

Trust Formation

T1	
Indicators	**Examples**
Formal behaviour Participants are in role & impersonal Formality Concern with membership	"I teach core French, Spanish and German." "Our school is a French Immersion school for kids from grades kindergarten to grade 6."
T2	
Being personal Showing one's self Expressing enthusiasm re membership in group Describing personal goals Opening up of feelings	"I look forward to hearing about and using new ideas that might stem from the discussions" "Although I am familiar with the Internet, I have not yet made steps to use it in my teaching"

Table 2

Open Communication

O1	
Indicators	**Examples**
Presenting official information and knowledge	Here is the address of one interesting primary school… They have a very strong technology focus.."
Building of polite facades	"I had students do research projects on topics like " La Musique" where they had to research a francophone singer and do a presentation online…"
O2	
Expressing opinion Expressing personal beliefs Expressing concerns Candour & spontaneity Disclosing	Forgive me if I am sometimes quiet. In a crowded room, I tend to watch and listen more than participate." "I must confess that I am one of those teachers who believes that the Internet is a very useful teaching tool but have not yet figured out how to incorporate it into my teaching on a regular basis."

Table 3

Realization of Goals

R1	
Indicators	**Examples**
Presenting an argument Creating boundaries Exerting pressure	The use of the computer and especially the Internet places the students more frequently at the centre of the learning process with the teacher now acting as facilitator and advisor." "The role of schools and teachers becomes one of guiding researchers to becomes powerful searchers in this information-rich environment…" "We must be careful and guide the students to appropriate websites that we have chosen and that we continue to monitor."
R2	
Wanting help/advice Asking converging questions Giving advice Offering solutions Soliciting an opinion Real problems and issues are discussed Agreeing & sympathising Risk-taking	Participants may want to share websites they find interesting." "Has a similar situation happened to anybody while a large group of students tried to access the same site?" "The other solution was that many of the students had their own addresses at home." "I agree completely with your beliefs since I actually experienced this."

Table 4

Interinfluence

I1	
Indicators	**Examples**
Challenging other's advice, goals, beliefs Critiquing an argument of a group member Authoritarian comment Expression of hostility Submissive behavior	"Something I gathered from reading the various mails is that most colleagues seem to 'test" all of this sites beforehand. I doubt that this is the use of the possibilities of the net to its full.." "Let's all be careful when talking about a 'digital approach' replacing communicative or any other teaching methodology." "I just wanted to point out that there may be reasons other than conceptual disagreements to not hurtle into using the internet as the primary resources for teaching. Vincent may be funded for revolution. I'm not even funded for status quo."
I2	
Acting on group member's suggestions, advice Co-operating Collaboration defining a problem Expression of a sense of belonging to a group	"Dear (Brigitte I am also a Core French teacher of grades 7-9. My grade 8's have visited your website and some are interested in corresponding with your students…I have told my students that I would let you know that letters might be forthcoming."

Prior to being coded, the messages were divided into three equal sets for each of CREDO and CREO corresponding to A the beginning period of the discussion, B the middle period and C the final period. Each message in CREDO and CREO was then coded based on which one of the four processes and their two phases the messages best represented. The coding involved focusing on each message holistically in an effort to determine which of the processes and phases was predominantly at play. The unit of analysis was that of meaning.

To ensure reliability, both researchers participated in and reached a consensus on codes assigned to units. Once all messages were coded, it was possible to begin identification of patterns in relation to Gibb's theory of the processes of development of trust leading to interdependence.

Results

The coding of messages using the instrument developed for the purposes of the present investigation is represented in Table 5. On the vertical axis are the four processes and the two phases related to each process (eight categories in total). The letters ABC in the row at the top correspond to the divisions of the messages into three equal sets with A corresponding to the first period of messages and C to the last. The numbers in each box correspond to the total number of messages representing one of the eight categories. The final columns for each of CREDO and CREO represent the total number of messages corresponding to a given category for the duration of each discussion (CREDO and CREO). The second stage of the analysis aimed to determine what patterns emerged from the coding. Table 3 provides a display of the data organized according to whether group development manifested itself more on a lateral level i.e. from the early phase to the late phase or whether the movement was more at the vertical level i.e. from the trust process to the interinfluence process.

Table 5

Results of coding of messages for CREDO and CREO

		CREDO				CREO			
		A	**B**	**C**	**ABC**	**A**	**B**	**C**	**ABC**
		%/45	%/45	%/46	%/136	%/14	%/14	%/15	%/43
T	1	7	0	0	2	7	0	0	2
	2	13	7	0	7	7	0	0	2
O	1	16	29	7	17	29	21	33.33	28
	2	24	4	11	13.5	29	7	0	12
R	1	16	38	28	27.5	14	29	33.33	26
	2	24	22	43	30	14	43	33.33	30
I	1	0	0	9	3	0	0	0	0
	2	0	0	2	1	0	0	0	0

Table 6

Results of coding of messages indicating lateral and vertical development

	CREDO				CREO			
	A	**B**	**C**	**ABC**	**A**	**B**	**C**	**ABC**
	%/45	%/45	%/46	%/136	%/14	%/14	%/15	%/43
1	38	67	43	49	50	50	67	56
2	62	33	57	51	50	50	33	44
T	20	7	0	9	14	0	0	4
O	40	33	17	30	57	29	33	40
R	40	60	72	57	29	71	67	56
I	0	0	11	4	0	0	0	0

Discussion of group-development processes in credo and creo

According to group-development theory, in best cases, group processes unfold from left (see number 1 in Table 6) to right (see number 2 in Table 6) and move toward interdependence (interinfluence) (see the letters T-O-R-I in Table 6). Initial concentration of processes on issues of distrust-trust such as those described by the coding with the number one are a necessary step toward more open communication. According to the Gibb's theory, the latter is also necessary for the group to reach self-determination and interinfluence. Therefore, in addition to a lateral move from a one to two in a given category of processes e.g. a move from a phase of T1 to a T2 phase, this analysis looked for development towards or a vertical move from the initial Trust process

through the processes until the Interinfluence two (I2) is reached i.e. from the T process to the I process.

The coded messages, which provided the basis for an analysis of the patterns of group processes, indicated that there was progression in the CREDO and CREO groups. While there was not a definitive move from T1 messages towards I2, there was a definitive move toward R2-type messages. The dearth of messages coded as I2 suggests that the group interaction did not occur at the stage of shared understandings. One should keep in mind, however, that the instrument may not be discriminative enough at its higher end, and further refinement is needed in order to capture the specificity of shared understandings (or interinfluence), that is, messages that are beyond manifestations of trust, open communication, and self-determination.

Nonetheless, in spite of the lack of results at the higher level of the instrument, collaboration in this community of teacher-learners is visible at all three other levels. There was a marked progression in terms of building of trust and in terms of moving towards and with shared goals. We can interpret that since the groups were gradually progressing toward, interinfluence, that with more time they might have achieved shared goals. However, we have no evidence on which to confirm this interpretation and we have no reason to believe that duration of the group alone constitutes a variable that might influence the group's development. We do argue, on the other hand, that facilitation can influence a group, and that the above results can help guide the facilitator's own writing and its monitoring of participants' writing. We also argue that participants can learn to be more trustful, open, and to manifest agency and interdependence.

In terms of comparing the processes identified in the CREDO group with those in the CREO group, the coding made evident that the groups were similar in their progress towards shared goals and interinfluence. However, they differed in the patterns of progression. Patterns in the CREO group were less discernable than were those in the CREDO group. In the CREO group, there was more of a vertical movement i.e. from the T process to the I process whereas in the CREDO group, the movement was more lateral i.e. between the early and late phases of each individual process. This suggests that the number of messages (136 for CREDO and 43 CREO) is not influential here in terms of group development. Further investigation which includes methods of facilitation may provide more insight into this issue.

Implications for group facilitation

This case study has shown that there are processes at work in groups which can be monitored and, it is expected, facilitated with the aim of orienting the group towards better levels of trust and open communication that lead to shared goals and understandings. The study has also shown that we cannot assume that simply because a group comes together within a virtual community with similar individual intents and purposes that it will eventually develop fully and be able to collaborate effectively in order to achieve common goals and shared understandings. For groups to develop to a point where there is interdependence or interinfluence, a conscious, systematic effort must be deployed. Such efforts can be supported by instruments which can be used by a group facilitator/moderator, and by group members themselves.

Group participants can be assisted in the process of becoming more effective members and in exercising distributed leadership in virtual group/communities through use of the various assessment tools provided by Gibb such as the TORI Group Self-diagnosis Scale (Gibb, 1972). These tools can be adapted for use in the case of online interaction and learning in the public domain as opposed to personal and interpersonal knowledge. The fact that written traces of communication are available to all participants means that the facilitator/moderator and participants themselves can formatively evaluate the interactions taking place with the learning goal of setting new directions, intervening, etc.

Group theory and the development of virtual communities

Group-development theory provides a means to understand processes at work within groups. Gibb's (1967,1972,1978) group-development theory was chosen as the framework with which to investigate the processes at work in a virtual community of teacher-learners. Other group-development theories (see Schutz, 1988; Tuckman, 1965; Fisher,1970; Tubbs,1995; Poole,1981,1983; Poole & Roth,1989) may prove useful in investigating group development in similar or in other contexts. These theories all have in common the fact that they delineate processes and phases each with marked characteristics which thus provide criteria from which to systematically evaluate a group's development.

Virtual groups and communities have the benefit of leaving a written trace of interactions which can be examined, monitored and analysed internally (by group members themselves or by the facilitator) or externally (by a person independent of the group such as a researcher) either in the course of the interactions for formative purposes or once the group has disbanded for summative purposes or for both. While the possibilities are numerous, what is important is that groups take advantage of the tools and opportunities provided by these theories in order to inform and guide their actions in such a way as to enhance learning.

Conclusions

What is significant about the results of this investigation is that they do not reject Gibb's hypothesis that there are processes at work in groups and these processes can be identified. The results also indicate that we can make use of the body of literature on group development theory to design instruments that can be applied in the study of processes ongoing in online groups. Furthermore, these instruments can be used not only to identify processes at work. Participants in online groups and moderators of such groups can make use of the instruments to facilitate these processes most conducive to collaboration and to the sharing of understandings and goals. Such instruments might be useful not only for virtual communities of teacher-learners but as well in workplace environments where collaboration in online groups is valued.

As was noted earlier, there are many other group development theories besides those elaborated by Gibb. Which of these theories might be more suitable to identifying and describing processes at work in online groups? How can we develop instruments to assess processes at work in these groups? Can we develop instruments for use by managers/moderators and by group members themselves for both summative and formative purposes? These are some of the questions worth investigating in relation to the identification and facilitation of collaborative processes in virtual communities.

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A Tutorial Paper

Creative Online Learning Environments

Donald G. Perrin

Introduction

Educational institutions add online options to extend Certificate and Degree programs to unserved and underserved learner populations. Potential advantages to the learner and provider of learning hinge on changes in pedagogy and ability to provide quality support for distance learning. The online experience is not necessarily better or worse than traditional classroom instruction, but it is different. This paper focuses on the transition process for teacher, student, and the provider organization. It discusses best practices, standards, and creative approaches to teaching and learning. It follows the design of an undergraduate business course at University of Maryland University College (UMUC) for online learning. This model is easily generalized or adapted for other online curricula and learning management systems.

A multiple section course for UMUC Department of Human Resources and Management (HRMN) is used to illustrate design, production, implementation, and management of an online course and how this is applied for education and training. HRMN 406 Employee Training and Development is a fourth year undergraduate course for Human Resource (HR), Training, and management personnel in business.

Needs assessment, goals and curriculum for classroom and online sections were predetermined by HRMN and Undergraduate Business Curriculum Committees. The assigned textbook is *Effective Training: Systems, Strategies, and Practices*, Second Edition, by P. Nick Blanchard and James W. Thacker, Prentice Hall, 2004. Online and classroom groups have similar syllabus, assignments, group projects, and a final proctored exam. Lecture discussion and other classroom techniques are replaced by conferences, study groups, chat, and email. For all sections, learning experiences follow the text. Class activities and materials for the online class are designed and managed by the instructor. The online and classroom sections are equivalent although pedagogy and schedules are different.

Online Instructor Training

Cohorts of instructors receive six weeks of online training to design, prepare, and manage online classes. This is an intense boot-camp-type experience to familiarize instructors with the various tools, give them first-hand experience in the role of student, and train them as instructors with rigor and procedures to design, produce, implement, and evaluate their online courses. There is no pretense about the work involved and new skills to be learned and mastered in a condensed time frame. The training of instructors is performed my online master teachers who model, demonstrate, and train the new cohort of instructors to be proficient and resourceful. Having mastered the tools, the creative part begins – designing and producing course materials for the rapidly approaching Semester.

Technology Base

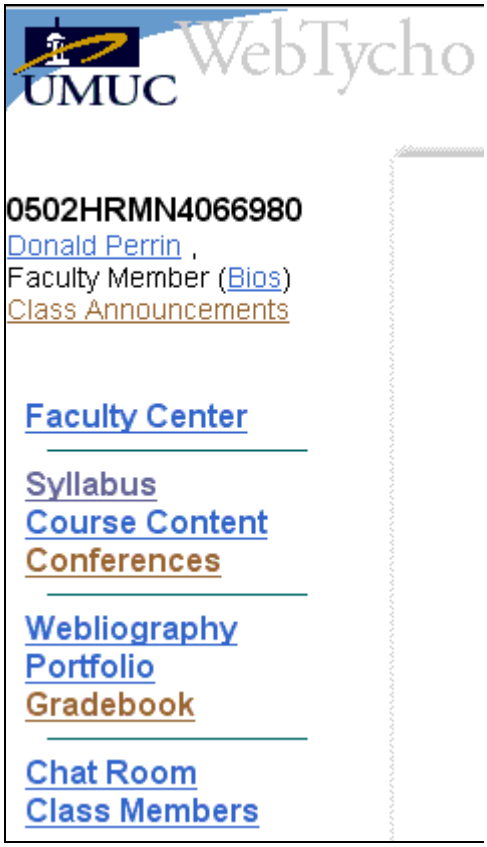
UMUC developed its own technology for online learning called WebTycho. Currently it serves more than 50,000 students and 2,500 instructors each 15-week semester. Administration is centered in Adelphi, Maryland, and courses are taught interactively through server farms in USA, Japan, and Germany. The technology is simple, flexible, and transparent for instructor and students. Except for chat and online help by telephone, all functions are asynchronous. Classes are accessed 24X7 around the world using any web browser. This enables students and instructors to be mobile and participate in class activities almost anywhere in the world.

When students sign on, they are greeted with Class Announcements and a set of Menus. The instructor has a similar screen with management options including Faculty Center, GradeBook, and Faculty Announcements, and Class Announcements.

Collectively, the UMUC website and WebTycho duplicate all resources of a comprehensive university – administrative offices, library, class catalog, syllabus, course content, schedule, conferences, study groups, chat rooms, learning assistance, testing center, and related services. Most are accessible from the WebTycho home page. WebTycho also has excellent Help from responsive and highly trained personnel.

Students use dialup or broadband to access UMUC on their web browser from anywhere in the world. They can respond directly on the page or work offline and paste or attach new topics or responses. Attachments can be text with graphics, spreadsheets, PowerPoint, or Acrobat files.

Online Tools



Class Announcements are generated by the instructor to introduce activities each week.

Faculty Center links to a comprehensive range of faculty services and resources and a powerful Learning Management System (LMS).

Syllabus provides goals, curriculum, schedule, grading, and specific course information. It also addresses Library, learning assistance, and student rights. The instructor can revise or add information specific to his or her class section.

Conferences are the focus of activity. They are an online version of lecture-demonstration and discussion with a difference. The presentation is short and succinct and the dialog is extensive.

Study groups facilitate collaborative development where team members are geographically separated (Study groups appear in the menu when a study group is activated.)

Webliography provides annotated references and links to relevant web resources such as professional journals, research studies, articles, and white papers. .

GradeBook appears only on the Instructor screen. It links student assignment folders into one table for grading **Assignments** replace *GradeBook* on the student screen. Students paste or attach assignments in this folder and receive grades and instructor comments.

Chat Room can be scheduled by instructor or students as a place for real-time interaction.

Class Members is a list of students, instructor, and assistants by name with links to individual or collective email accounts and bios.

Instructional Design for Online Learning

In online instruction, the focus moves from teaching to providing environments to facilitate learning. Web advantages compensate for lack of face-to-face contact:

1. **Anywhere-Anytime Schedule**. Class does not occur at a particular hour on a particular day. It is available 7 X 24 on the Web. It can take place anywhere there is a computer and internet connection. It is even possible to complete class activities off-line and paste or attach them at the next web session. This flexibility enables instructors and learners to respond to job pressures, meet family emergencies, and even travel while participating in class. At the instructor's option, weekly conferences can be available ahead of schedule and open for additional weeks so all can participate fully.

2. **Interactivity**. Compared to traditional classroom instruction, the Web offers a multitude of interactive resources. Real-time (synchronous) options include Internet Phone (Voice On IP), Chat, NetMeeting, Live Meeting, and video conference media. Anytime (asynchronous) options includes email, chat rooms, conferences, study groups, "surfing" the web and using search engines to explore databases and libraries. Asynchronous communication can take place 24 X 7 using chunks of available time causing minimal interruption to work and family activities.

3. **Participation and Community**. For most students, success requires a community of learners – a learning organization. The sense of community is developed by interaction, dialog, sharing, and collaborative activities. These enrich learning experience and improve course completion rates.

4. **Motivation**. Keller's ARCS Model for Instructional design identifies four essential strategies to motivate the learner:

   Attention strategies to arouse and sustain curiosity and interest;

   Relevance strategies that link learners' needs, interests, and motives;

   Confidence strategies to develop a positive expectation for achievement;

   Satisfaction strategies for extrinsic and intrinsic reinforcement of effort.

   "Buy in" requires clear objectives, participation, value, and expectation of success.

5. **Theory, Practice, and Creativity**. Knowing why (theory) is important, but successful application (practice) is even more important. For that reason, practical experience, problem solving, simulations, and creative activities should be the culmination of each course topic. Knowledge *per se* is less important than ability to acquire current information, and *performance* involving higher levels of Bloom's Taxonomy (comprehension, analysis, synthesis, and evaluation) is the yardstick for success. Constructivist theory is widely used by instructors, but Connectivism should also be examined.

6. **Working with Adult Learners**. UMUC attracts motivated persons. The majority are competent professionals in need of additional qualifications. The diversity of experiences they share in conferences is ideal for Peer Learning using the Bensusan Method. It is also a rich resource for newcomers to the field.

7. **Best Practices**. Curtis Bonk performed a number of studies for industry and government that provide data on many aspects of training online. For example, using Kirkpatrick's model, he determined that 80% of training organizations measured learner satisfaction, about 60% measured KSAs, less than 50% measured performance and only 30% measured Return On Investment. (Online Training in an Online World, p. 60.) Even though this landmark study is over three years old, it is a treasure chest of valuable data on practices and trends prevalent in business and industry.

   In the year 2000 the Higher Education Program and Policy Council of the American Federation of Teachers published a study entitled Distance Education: Guidelines for Good Practice. Even though this study is directed to education rather than training, it highlights some of the issues such as ownership, control, quality, accessibility, media types, class size, evaluation, and support services. The questionnaire and data is included with the study.

AFT - 14 Best Practices:

1. Faculty must retain academic control.
2. Faculty must be prepared to meet the special requirements of teaching at a distance.
3. Course design should be shaped to the potential of the medium.
4. Students must fully understand course requirements and be prepared to succeed.
5. Close personal interaction must be maintained.
6. Class size should be set through normal faculty channels.
7. Courses should cover all material.
8. Experimentation with a broad variety of subjects should be encouraged.
9. Equivalent research opportunities must be provided
10. Student assessment should be comparable.
11. Equivalent advisement opportunities must be offered.
12. Faculty should retain creative control over use and re-use of materials.
13. All undergraduate degree programs should include same-time same-place coursework.
14. Evaluation of distance coursework should be undertaken at all levels.

Preparing the Online Learning Environment

Organizations and individuals who think putting syllabus and lectures on the web constitutes an online course should read Current Myths and Future Trends in Online Teaching and Learning (2002) by Curtis Bonk.

The web interface as an interactive environment for communication and learning that forces a paradigm shift from teaching to learning, from knowledge testing to performance measurement, and from regurgitating knowledge to performing at upper levels of Blooms Taxonomy of Behavioral Objectives - conceptualization, application, analysis, synthesis, and evaluation.

Instructional Design

Variations of the Jerrold E. Kemp's Instructional design model have proven effective for over 35 years. Kemp proposed a cyclic model where revision would reinitiate the cycle to further improve learning outcomes. For team production, this version adds additional detail:

1. analyze needs, goals, resources, constraints, learner characteristics
2. determine outcomes, priorities, standards
3. write performance objectives, develop rubrics to measure performance
4. choose content, learning environments, learning strategies, delivery systems
5. produce, test, revise, validate prototype lessons and rubrics
6. develop and implement course modules
7. evaluate, repeat the cycle to revise

As with the Kemp model, it is not necessary to start at step one. For example, a pre-existing course can be modified starting with step 4. Earlier steps will be upgraded in the revision cycle.

If you are a production team of one, you may need to delete step 5 in order to produce your initial lessons and stay ahead of the students. The ADDIE Instructional Design Model (analyze, design, develop, implement, and evaluate) is widely by instructors for online development.

Before the first week of classes you need your final syllabus, course goals, course description, schedule of classes, operating procedures, evaluation plan, at least three completed lessons.

When the Semester begins, allow time almost every day to respond to emails, participate in conferences, provide guidance and "course corrections", read and grade assignments. Some instructors schedule chat sessions and "office hours." I offer my cell phone number 24 X 7 for "now" problems and emergencies. It is seldom used and rarely abused.

Expect a mixture of first-time online learners and persons at various stages of online degree programs. Begin with a welcome message, an introduction to the course, and simple instructions so students can move forward on their own. Here is an example:

Week 1

Introduction to Training

Jan 24-30, 2005

Welcome to HRMN 406 – Employee Training and Development. This course will enable you to develop a training plan and training materials for classroom or online instruction.

Start reading the textbook as soon as possible. The early chapters are an excellent foundation for the tasks ahead. Most chapters are about 50 pages so allow enough time each week to read the text, participate in conferences, and work on assignments that are due at three weeks intervals. Print the schedule from Syllabus > Course Schedule. To print the contents of any page, right-click inside the page and click Print in the context-sensitive menu.

Conferences and assignments follow the chapter sequence in the book so keep up-to-date as much as you can. Better still, read ahead. Later chapters in the textbook are lengthy and detailed. If you do not have time to read them in their entirety, scan them for main ideas and use them as a reference source for conferences and assignments.

Note the grading system. You start with 1000 points. 900+ is an A, 800+ is a B, and so on. My goal is to get you the highest possible grade based on your *performance* in the course. You can be late without penalty (if you are late you are already penalized because you are behind schedule). Also, you can redo one assignment to make up lost points.

Email or phone me if you need help, guidance, or clarification. If life is giving you a raw deal, talk to me about ways to complete this course rather than bail out, which would cost you time and money to repeat. I can bend to your schedule, guide you, cajole you, or whatever you need, but ultimately you have to do the work.

Assignments 1-4 take you through the stages of developing a training plan. In the Final assignment you combine and edit them into a total training plan. You also generate a training plan for your final proctored exam. This is not an exam in the traditional sense. It is a simulated real-life experience where management gives you a specific set of requirements and you have three hours to generate a customized training plan. Like the real-world, you can use your textbook and notes. (For the exam, you will not be able to use a computer or the Internet).

My mentor, the late Guy Bensusan, was a proponent of peer learning. He loved to be the sage-on-the-stage, but he found a rich resource within his classes that made teacher domination an interference. Learners are themselves a major resource. Their collective experience, knowledge and skills dwarf even the great Guy Bensusan. This course in Employee Training and Development draws heavily on class members sharing ideas and experiences from the real world. We are products - and sometimes victims - of training and education. Everybody knows how it works. Everybody knows how to make it better. In HRMN 406, we assess, design, create, implement, and evaluate at least one lesson to show the world, or an employer, we can do it right.

Some confidential information will help me to better support your needs. Please email and tell me if you are using WebTycho for the first time, if you have a disability that influences how you learn, if you are traveling or currently reside outside the continental United States, or if you are in a security zone where you cannot easily access the Internet. Alert me if family concerns or work pressures throw you off schedule. Tell me if you are about to graduate or preparing yourself for a specific job.

Share things you want everybody to know around the Water Cooler, or when you introduce yourself in Week 1. Last semester we had two births with baby pictures and that was a treat. Share the joy!

My goal is to make this a quality experience where you leave highly motivated, with an abundance of relevant knowledge, experience, skills, and techniques; a great portfolio, a good grade; and whatever it takes to make you a better professional and get you a better job. Of course, you have to do the work!

As needed, contact me at dperrin@itdl.org and cell phone (7x24) at 805-300-8080. Go to the **Class Members** menu, click the box next to my name, and send me an email with a few sentences about your goals and expectations for this course. I look forward to working with each one of you through the coming months!

When you are ready, go to Conferences – Week 1. Along the way, you might want to visit the Water Cooler.

Don Perrin

When the learner clicks on Conferences, Water Cooler is the top menu item. It is a place for informal communications - a relaxed place to talk about anything, ask questions, and get answers. Occasionally there is a call for help, a dialog, discussion, or free-for-all. It is a bulletin board, a place to meet and greet, spend a few minutes relaxing in cyberspace, to "listen" or join the dialog.

Beneath the Water Cooler link is the Conference for the current week. The preceding weeks move down as new weeks are added.

Conference is the focus of for learning activities. As in a classroom presentation, the instructor sets the stage with a presentation, case-history, reading or other resource. In online learning the presentation is short and succinct and the dialog voluminous. Online does not have time restriction imposed by classroom schedules. Conferences continue for a week, and students can *attend*, reflect and respond anywhere and anytime. Unlike the on-campus classes, there is time for every student to contribute ideas. There is time for interaction between students, and between students and instructor. There is time for research, reflection, and organizing what is presented. There is time for learning!

Peers sharing real-world experiences have value, freshness and reality that stimulate motivation, communication, and learning. Learner-practitioners provide relevant content and first hand experiences to reinforce, modify, or even eclipse information and case histories in the textbook and instructor presentations. Invariably, the online dialog is longer and richer than the lesson; a stark comparison to classroom learning where the instructor may dominate and leave little time for discussion.

My approach is to use conferences to complement the readings. Sometimes it is used to enlarge upon a topic which the text skims over, like learning styles, mission statements, or ways to modify lessons for use online. Three examples follow:

Conference Example #1:

In Week 2 we deal with Strategic Planning, Mission Statements, and Organizational Development. It appears that Training is an essential part of everything and funds are limited. Are there legitimate low-cost alternatives to training? This short conference elicits creative answers.

They fired the cook!!!

Well, not exactly. They never hired a breakfast cook for the Kellogg Center in Pomona. The pantry manager had already bought makings for waffles with strawberries and cream - enough inventory to last for weeks. It was estimated there would be 200 people for breakfast each morning. Approximately 40 people would order waffles between 7:00am and 9:00am.

The only staff member was the pantry manager, who ordered, stored, and set out the food, and two people who poured coffee and cleared tables.

The enterprising manager plugged in the waffle-maker beside a jug of rather liquid waffle dough, a bowl of strawberries, and a bowl of cream. She wrote a sign and posted it above the waffle maker.

1	Open waffle maker
2	Spray PAM on cooking surfaces (1-2 seconds)
3	Pour one full ladle of waffle mix on bottom plate
4	Close. Set timer to 2 minutes
5	Remove waffle with fork (Hot!)
6	Replace top
7	Add strawberries and cream

The waffle maker became the focus of attention. People gathered around and conversed while they made their breakfast. Clients liked it so much the Center had to buy a second waffle iron!

What the Pantry Manager created was a ***Performance Aid***. No training was necessary. Performance-aids and checklists are widely used in the workplace and at home.

Respond to this conference by naming

1. Five performance aids in your workplace
2. Five performance aids in your home
3. One or two "non training" solutions other than performance-aids and checklists?

Try to avoid responses given previously by other students, and *have fun*!

Conference Example #2:

This Conference is borrowed from a statewide curriculum that I produced for the California State Department of Education. It draws attention to different learning styles that need to be considered in design and implementation of education and training programs.

THE LEARNING STYLES INVENTORY

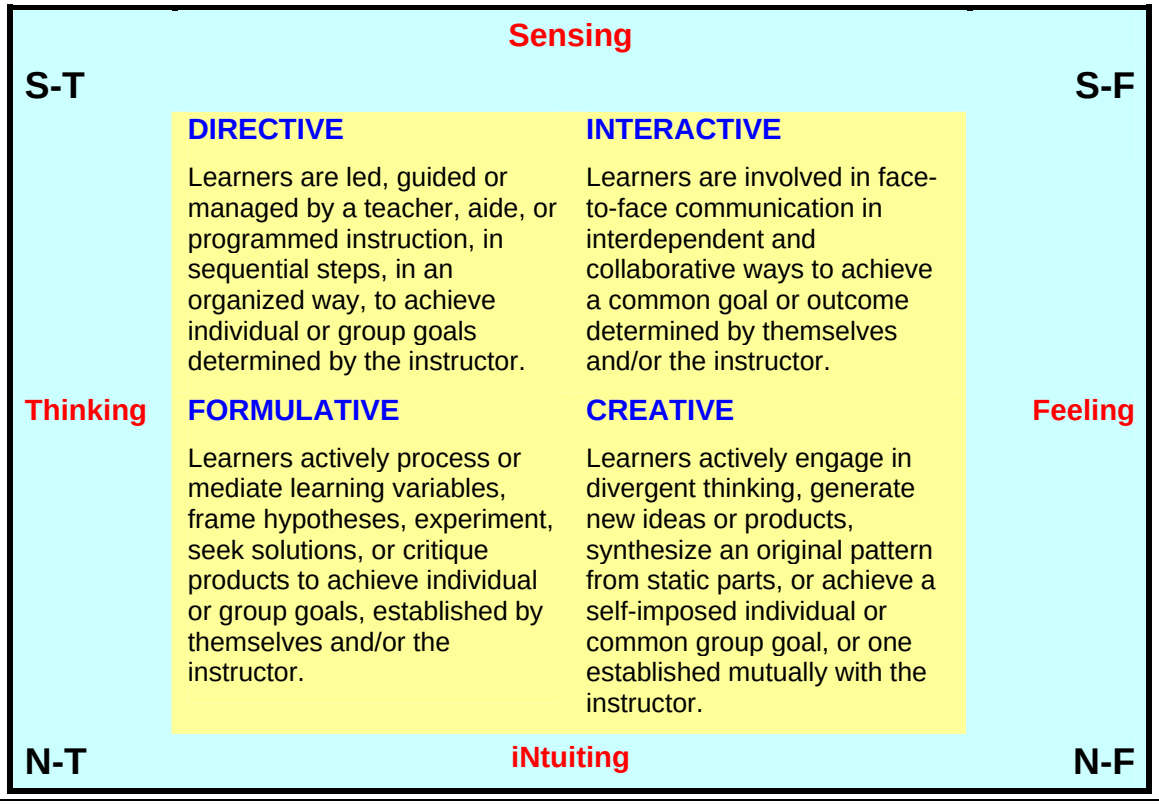
The ***Learning Styles Inventory*** identifies four learning styles – directive (traditional), inquiry (Formulative), creative, and interactive.

People learn in all modes, yet one style is usually dominant or preferred.

The lecture is a *directive* style of learning--a step-by-step development toward a goal set by the instructor. This style is not for everyone. Students who are curious explore and work things out for themselves. Students who are creative are frustrated by slow and linear presentation. Students who prefer team learning are stifled by lectures and lack of interaction. The result is that curious, creative, and interactive learners - non-traditional learners who act independently or in dynamically formed groups - are considered to be inattentive, disruptive, disobedient, or even poor students. Brilliant persons like Albert Einstein, Bill Gates, and Whoopee Goldberg belong in this category. Their different approach to learning caused them to be *learning disabled* in a traditional classroom.

Harvey Silver noted that mismatch between teaching styles and learning style may be as frustrating as trying to write with your other hand! He diagramed the relation between different learning styles as shown below. Because the inventory is based on Jung's theories and the Myers-Briggs Personality test, Myers-Briggs terms S-T-N-F are used in the descriptions.

The Learning Styles Inventory



DIRECTIVE (Traditional Classroom)

A **S**ensing-**T**hinking person (S-T) fits the traditional ***DIRECTIVE*** model of teaching and learning via lecture-demonstration, presentation, and tutorial. This learning style fits persons who are practical, matter-of-fact, and work oriented. This is the dominant instructional mode for adult learners and does not well serve the needs and preferences of those who are inquiry oriented, interactive, and creative.

FORMULATIVE (Independent Exploration)

An i**N**tuitive-**T**hinking person (N-T) has a mind that is ***FORMULATIVE*** or inquiry oriented. This learning style fits upper cognitive endowed persons (highly intelligent) who are logical, ingenious, and curious who learn best through exploration and experiment. This is the most natural way of learning since curiosity leads to experiment, or trial and error, and the results are learned. This person tends to be self directed and proceeds ahead of the instructor in examining and developing his or her own learning. What may seem to be an oppositional, very divergent, or baffling student behavior masks the powerful learning that *could* take place. In the hands of an insensitive teacher this learner is set up for discouragement and failure. The same person may excel in a science fair or a self directed project.

INTERACTIVE (Team Activities)

A **S**ensing-**F**eeling person (S-F) is ***INTERACTIVE*** and fun to know. This learning style fits persons who are sympathetic, friendly, and cultivate group harmony. This person is gregarious, likes to work collaboratively and is a productive team member. He or she functions better as part of a team than working alone. In school this person may be ideally identified as the helper to students new to the class or experiencing some lesson difficulties; and an eager helper to the teacher in problem solving whatever the situation may be.

CREATIVE (Multiple Intelligences and Divergent Thinking)

An i**N**tuiting-**F**eeling person (N-F) is invariably insightful, imaginative, and ***CREATIVE***. This person is recognized as an innovator, inventor and artist in his or her chosen disciplines. Creative persons often seem disorganized because their minds move rapidly and simultaneously in divergent paths. Some do not fit well in traditional learning environments and may fail or do poorly in required courses because they do not meet scheduled deadlines; have trouble organizing information; or produce products divergent to the instructor's intentions. Fortunately they are capable of taking care of their own learning even if they do not respond well to traditional methods of teaching. However, as suggested above, they often suffer consequences and may dislike or drop out of school despite high academic potential.

Integration of Learning Style Preferences

In traditional or directive learning, the instructor controls lesson goals and presentation. In the other three quadrants, students participate in goal-setting and assume greater responsibility for learning. Harvey Silver advocates *teaching-around-the-wheel* which means combining a variety of teaching-learning styles within a lesson to involve a wider range of students. Note that WebTycho integrates all four methods of teaching and learning. Incidentally, our teaching and managing styles tend to reflect our learning style preferences because both are tied to personality.

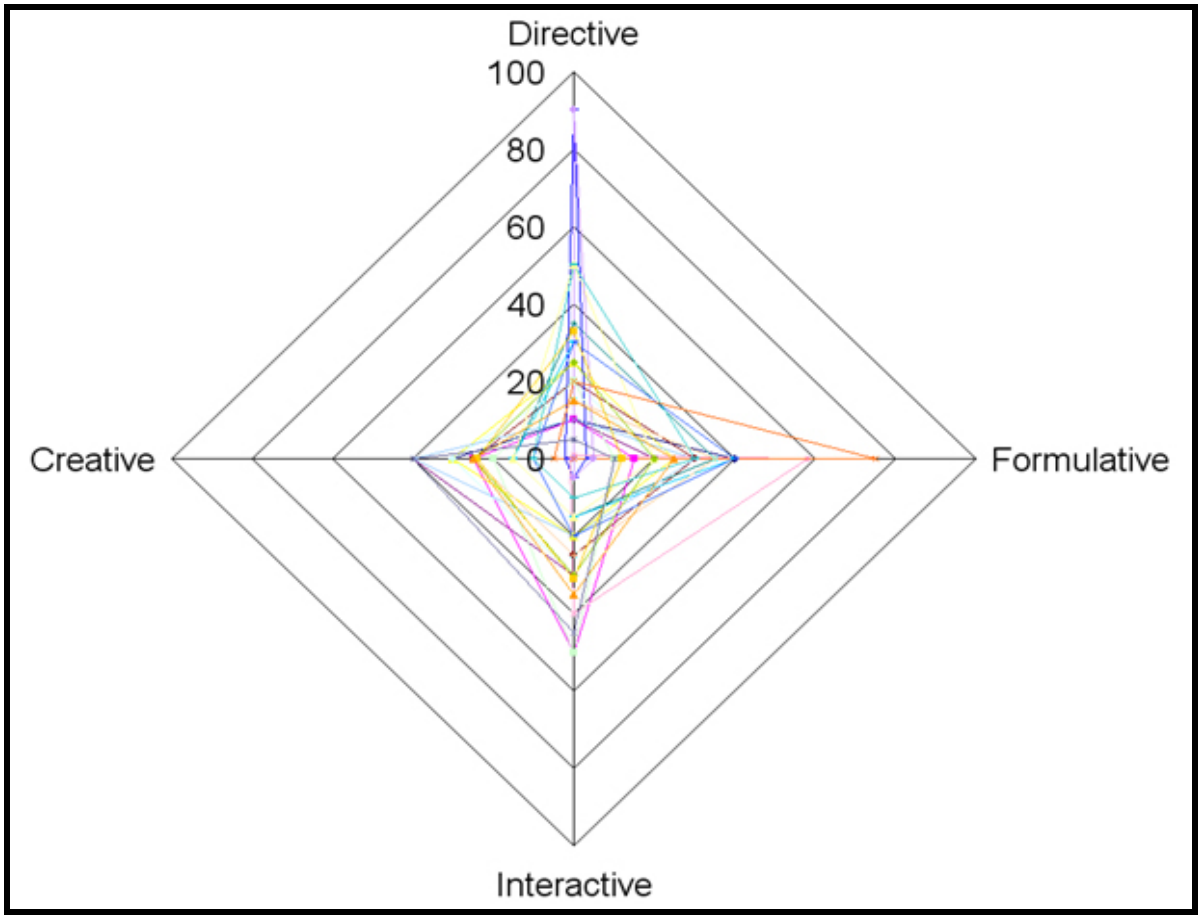
Project 3 #1

Rate your personal preferences for each learning style as a percent for each style that total 100%. Click **Respond** and post your data in the following format:

%Directive_____, % Formulative_____, % Interactive_____, % Creative_____.

Data is tabulated, reproduced four times sorted by each of the learning modalities, and plotted graphically. This data is available for students to 1) find one or more members of the class with similar learning style preferences, 2) determine the dominant learning style (s) for this class, and 3) find clues to determine if specific professions attract similar profiles.

The graphic profile of a recent class is shown below:



From the beginning, peer interaction is an important component. For example, after the presentation on mission statement, the conference proceeds as follows:

Project Week 2 #1

Find the mission statement for the organization where you work or write one. Alternatively, write a mission statement for the organization you selected for your project.

1. Click **Respond** and change the header title to <*Your Name*> Mission Statement. Write your mission statement
2. Review two other mission statements posted by class members and **Respond** with suggestions to clarify the mission and sharpen the focus.

Mission statements take organizations months, sometimes years, to develop. I don't tell that to the students. Their first efforts are amazingly good and they help each other with comments like "I really like your mission statement because it is simple and succinct, but what does your organization do? Some students take the time to write out the suggested revision. It is a great collaborative exercise to establish the pattern of helping each other.

Conference Example #3:

In week 3, Writing Objectives becomes the focus of activity. At the risk of duplicating materials learned elsewhere, the entire process is spelled out so all participants are on the same page as they assist each other to write mission statements and objectives.

The Design Team

How would you define a Trainer, Instructional Designer, and Learning Architect?

Trainer

The **Trainer** instructs the learner using predetermined lesson plans, curriculum and instructional materials. The trainer adapts the lesson to maximize effectiveness, and guides, motivates, instructs, mentors, tutors, and evaluates students.

Instructional Designer

The **Instructional Designer** is a creative person with writing, curriculum, and media skills. The designer produces courses, lessons and workshops to meet a specific set of objectives. This involves selection and organization of content (KSAs), integrating content with appropriate methods of teaching and learning, and production of environments to facilitate learning.

Learning Architect

The **Learning Architect** (a relatively new term) coordinates design of total learning programs beginning with needs assessment of stakeholders and practitioners - community, employers, instructors and students. For many companies, their market is the global community

Setting Goals and Objectives

An overall mission statement provides a focus for prioritizing goals and objectives:

Mission Statement

A *mission statement* is the essence of what an organization desires to accomplish in terms of products and services, clients, community, and purpose.

Strategies

Strategies define how the mission will be accomplished and how to match the organization's internal operations to the external environment.

1. Set up short-and long-term business objectives for the organization;
2. Determine courses of action to achieve those objectives;
3. Establish schedule, management, and accountability systems; and
4. Allocate resources for each phase of the strategic plan.

Strategic plans attempt to maximize opportunity and minimize market uncertainty.

Goal Statements

Goal Statements describe the intended accomplishment or end result. For example, the National Institutes of Health, Heart and Lung Division, have a goal to:

Eradicate heart disease as a cause of death in the United States.

Implementation requires objectives that are observable and measurable. A standard determines when the objective is achieved. The following objectives are intended to reduce the cholesterol level of a defined population by an average of 50 points:

Legislation:

- Label all packaged foods for nutritional content, fat, and calories as specified by the FDA.
- Improve eating habits through education programs.
- Encourage participation in activities sponsored by local departments of Parks & Recreation.
- Reduce consumption of snack foods and cigarettes by 50%, and reduce obesity by 25% in the next two years

Workplace, schools and other organizations

- Offer "health food" alternatives at cafeterias and restaurants

Note how these objectives describe outcomes. Mager tells us there are three parts to a well-written objective:

1. The outcome is stated clearly and without ambiguity.
2. The conditions under which it is measured are stated.
3. Criterion performance is stated.

Note that objectives start with an action word with a precise meaning. Mager points out that words like *appreciate* and *understand* are too vague for measurement purpose.

Let us examine the first objectives based on Mager's model.

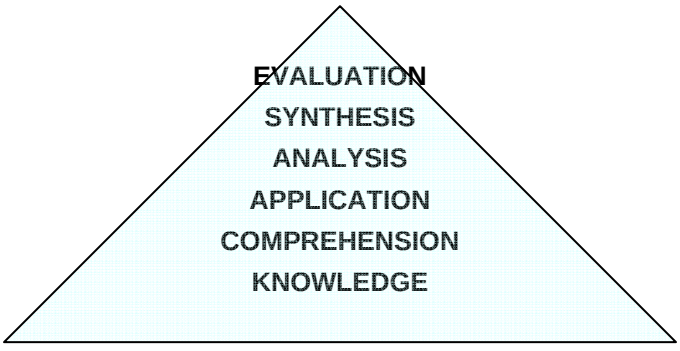
Label all packaged foods for nutritional content, fat, and calories as specified by the Food and Drug Administration.

1. The outcome is a nutrition label on packaged foods;
2. The condition - what is considered to be food and what is on the label - is specified by FDA.
3. The level or criterion is ***ALL*** packaged foods have nutrition labels.

This program was conducted 30 years ago with than intensive campaign involving print, electronic, and face-to-face communications for a defined community - Stanford CA. The program achieved its goal and results persisted for about 18 months.

Levels of Learning

Choosing the right action word establishes the level of learning. For example, knowledge is the base level for cognitive learning. Concept formation is the next higher level. The hierarchy, according to Benjamin Bloom, is knowledge, concept, application, analysis, synthesis, and evaluation. Each level requires an increasingly broader base of knowledge and experience.



When you are writing objectives, select an action verb at the appropriate level from the list on the next page:

Cognitive Level	Typical Action Verbs
Evaluation	appraise; compare & contrast; conclude; criticize; critique; decide; defend; interpret; judge; justify; reframe; support.
Synthesis	adapt; anticipate; categorize; collaborate; combine; communicate; compare; compile; compose; contrast; create; design; devise; express; facilitate; formulate; generate; incorporate; individualize; initiate; integrate; intervene; model; modify; negotiate; plan; progress; rearrange; reconstruct; reinforce; reorganize; revise; structure; substitute; validate.
Analysis	break down; correlate; diagram; differentiate; discriminate; distinguish; focus; illustrate; infer; limit; outline; point out; prioritize; recognize; separate; subdivide
Application	act; administer; articulate; assess; chart; collect; compute; construct; contribute; control; determine; develop; discover; establish; extend; implement; include; inform; instruct; operationalize; participate; predict; prepare; preserve; produce; project; provide; relate; report; show; solve; teach; transfer; use; utilize.
Comprehension	classify; cite; convert; describe; discuss; estimate; explain; generalize; give examples; make sense out of; paraphrase; restate (in own words); summarize; trace; understand.
Knowledge	define; describe; enumerate; identify; label; list; match; name; read; record; reproduce; select; state; view.

The portal for Bloom's Taxonomy is: http://faculty.washington.edu/krumme/guides/bloom.html
It provides the following useful definitions:

> **Knowledge:** terminology; specific facts; ways and means of dealing with specifics (conventions, trends and sequences, classifications and categories, criteria, methodology); universals and abstractions in a field (principles and generalizations, theories and structures): Also defined as remembering (recalling) information.
>
> **Comprehension**: Grasp (understand) the meaning of informational materials.
>
> **Application**: Use previously learned information in new and concrete situations to solve problems that have single or best answers.
>
> **Analysis**: Break down information into its component parts, examine (try to understand) organizational structure to develop divergent conclusions by identifying motives or causes, making inferences, and/or finding evidence to support generalizations.
>
> **Synthesis**: Creatively or divergently applying prior knowledge and skills to produce a new or original whole.
>
> **Evaluation**: Judging the value of material based on personal values/opinions, resulting in an end product, with a given purpose, without real right or wrong answers.

Note: *There are Two Other Domains for Education and Training Objectives:*

Affective Domain (emphasizing feeling and emotion) and Psychomotor Domain (motor skills)

PROJECT 3 #2

1. **Apply Mager's criteria** to the health objectives listed in the Conference on Eradicating Heart Disease and rewrite them as necessary.
2. Based on the mission statement you created in week 2, **write one goal and three objectives** that meet Mager's criteria. Pay attention to action words used to describe the performance or outcome, and state **the cognitive level of each objective** (knowledge, comprehension, application, etc.) based on the action required.

Conference Example #4:

Students have difficulty in translating performance objectives into performance evaluation tools. In an earlier lesson, Likert scales were used for assessment. These quantify the estimates of employees, supervisors, employers, and clients about the knowledge, performance, and attitudes (KSAs) of a specified group on a five step scale. This provides valuable data for setting training priorities. The success of training must be measured by actual performance – not somebody's opinion. If the objective is to reduce fat in the diet to lose weight, you measure weight to ascertain the degree of success. What people think or what they ate does not measure weight loss.

The Rubric measures steps toward the goal, when it is reached, and when it is exceeded. Consider the following rubric to measure ability to write a paragraph:

Rubric Template

Writing a Paragraph

Student_____ Instructor_____

	Beginning 1	Developing 2	Accomplished 3	Exemplary 4	Score
Introduction/ Topic	Questions or problems are **teacher generated**.	Student(s) **require prompts** to generate questions and/or problems.	Student(s) **generate questions** and/or problems.	Student(s) properly generate questions and or problems **around a topic**.	
Conclusions Reached	**A** conclusion is made from the evidence offered.	**Some** detailed conclusions are reached from the evidence offered.	**Several** detailed conclusions are reached from the evidence offered.	**Numerous** detailed conclusions are reached from the evidence offered.	
Information Gathering	Information is gathered from one or two sources **only**.	Information is gathered from **limited** electronic and non-electronic sources.	Information is gathered from **multiple** electronic and non-electronic sources.	Information is gathered from multiple electronic and non-electronic sources and **cited properly**.	
Summary Paragraph	**Weakly** organized and poorly written.	Well organized, but demonstrates illogical sequencing **and** poor sentence structure.	Well organized, but demonstrates illogical sequencing **or** poor sentence structure.	Well organized, demonstrates **logical** sequencing and sentence structure.	
Punctuation, Capitalization, & Spelling	There are **four or more** errors in punctuation and/or capitalization.	There are **two or three** errors in punctuation and/or capitalization.	There is **one error** in punctuation and/or capitalization.	Punctuation and capitalization, and spelling are **correct**.	
Grammar	3 errors	2 errors	1 error	No errors	
				Total	

Criterion is reached at 3 leaving opportunity to recognize the exemplary student with 4 points. Requirements for each aspect of the activity are separately measured and the scores combined

Conference Example #5:

This Conference asks learners to relate Giuliani's 5-Points on Leadership to those required for a Director of Training position.

Rudolph W. Giuliani: 5-Points on Leadership

According to Elliot Masie, "Rudy Giuliani . . . used learning, training, and competency as a core tool to improve New York City and cope with the events of 9/11." Mayor Giuliani was effective in reducing crime and improving the quality of life in New York City. After the terrorist bombing, he brought strength and stability at a time of great uncertainty. He calmed, consoled and reassured the public and the nation, urging New Yorkers to return to their normal lives so that terrorists would fail to achieve their goal of fear and disruption. His presentation at the 1992 eLearning Convention in Washington D.C. was inspiring and rich in information about his goals and experiences.

Rudolph Giuliani presented the following five points on Leadership based on his experiences as Mayor of New York City:

1. **Philosophy or belief** - understand your internal values and articulate them for those who work with you. Be consistent in your statements and actions. Set new horizons for people to reach.
2. **Courage** - manage fear to enable positive action. Play "what if?" scenarios to familiarize yourself with options and determine most effective course of action.
3. **Relentless preparation** - know as much as you can possibly know. You can never prepare enough and educate enough. Engage in continual training and preparation. Learn from History.
4. **Build Teamwork** - Assess the environment as you apply what you have learned from 1-3 above. Lead your team and manage your resources.
5. **Communication** - find new ways to motivate people. Tell people what you expect of them; have people tell what they expect from you.

Former Mayor Giuliani explained how education and training, his knowledge of history, and years of preparedness-drills influenced his decisions as events of September 11 unfolded. He realized this disaster was larger than Pearl Harbor, directed at civilians rather than military, and required leadership more like Winston Churchill during 13 month bombing of London. He mobilized the collective experience (Knowledge, Skills, and Attitudes - KSAs) of fire, police, hospitals, local, state and national government, social agencies, businesses, and construction workers for rescue and relief. The rest is history.

Former Mayor Giuliani credited education and training as key factors in success of his programs to improve New York City and recover from the events of 9/11.

Conference 10/2

As the person in charge of training, what management / leadership style is most appropriate for you and your organization?

In a typical class, distribution across the five points is about even. Responses tend to be lengthy – often 100-200 words detailing the rationale for selection. This is a rich data source for researching a relevant job description. This is done in a later exercise.

The Final Proctored Exam

As stated earlier, this is a simulation of a real world situation based on an actual case history or a fictitious company problem. For the learner, there is an element of problem solving and creative activity to compose a viable proposal. A multi faceted problem is provided so each learner can choose a part consistent with his or her background and interests.

The successful training plan includes:

1. ADDIE tools to achieve the required objective(s).
2. A management plan and budget.
3. A way to evaluate performance
4. A simplistic ROI justification
5. All of the above in a clearly articulated proposal

Proposals that are well written and complete will receive full marks.

The Grade Book

Gradebook

To begin, click *Create Assignment* (below.) To view or edit an assignment click on *Manage Assignments*.

Overview | Abstract | Assign1 | Assign2 | Assign3 | Assign4 | FinalA | Exam | Conf |

Student	Abstract (10%)	Assign1 (10%)	Assign2 (10%)	Assign3 (10%)	Assign4 (10%)	FinalA (20%)	Exam (20%)	Conf (10%)	Final C
	95	100	100	95	100	198	195	60	94.3%
	90	100	97	94	100	180	190	66	91.7%
	100	97	100	96	100	192	190	75	95%
	90	88	92	94	100	175	165	55	85.9%
	90	92	88	96	96	195	185	80	92.2%
	88	92	100	93	95	193	190	100	95.1%
	96	98	97	92	100	195	198	100	97.6%
	97	98	99	100	100	196	192	75	95.7%
	95	96	95	92	95	185	180	90	92.8%
	98	98	100	100	100	190	200	100	98.6%
	97	93	100	95	98	195	192	80	95%
	45	94	95	92	94	184	172	75	85.1%
	0	88	0	0	0	0	185	95	36.8%
	97	91	93	95	96	183	195	100	95%
	100	98	95	100	95	200	180	70	93.8%
	80	88	96	100	98	185	180	60	88.7%
	97	85	93	97	96	195	185	100	94.8%
	96	95	90	80	90	192	175	90	90.8%
	96	100	97	97	95	195	180	100	96%
	96	98	94	100	0	196	0	100	68.4%
	97	97	100	97	100	195	185	95	96.6%

The instructor needs only to click on each tab to access student work, assign grades and add comments.

Conclusion - Creativity in Online Environments

The instructor combines art and science to develop an environment for online learning. Clear objectives and relevant interactive experiences facilitate the development of a successful learning organization. Online learning provides unusual flexibility for non traditional learner, persons who lead complicated lives, and persons distant from a college or university.

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Donald G. Perrin has a Ph.D. in Communications and Instructional Technology from the University of Southern California. He has won awards for research, creativity, teaching, scholarship, and instructional media. His scientific and documentary films ffor the Australian Government were shown at Cannes and Edinburgh Film Festivals. He was first Chief of Instructional Technology in the Department of Defense, founding Director of the Alquist Center for Innovative Learning at San Jose State University, and Editor of the USDLA Journal from 1995-2003. In 2004 he became founder and Executive Editor of the International Journal of Instructional Technology and Distance Learning at http://itdl.org.

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